PAPER TRADE JOURNAL

VOL. 123 NO. 23 DECEMBER 5, 1946

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ATLANTA BRANCH
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WOOD PULP

G

60th YEAR
1886 — 1946

"The past is gone and static. The future is before us and dynamic. Each day brings with it new frontiers. We are just at the beginning of progress in every form of human endeavor."

CHARLES F. KETTERING in "This Week"

Remarkable as have been the developments in Pulp and Paper since the turn of the century, they will certainly be eclipsed in the years ahead. It is our hope to share in the growth of the future as we have in the notable advancements of the past.

GOTTESMAN & COMPANY

— INCORPORATED —

WOOD PULP

22 EAST 40th STREET • NEW YORK 16, N. Y.

EUROPEAN OFFICES: Birger Jarlsgatan 8, Stockholm, Sweden

MILL EQUIPMENT NUMBER

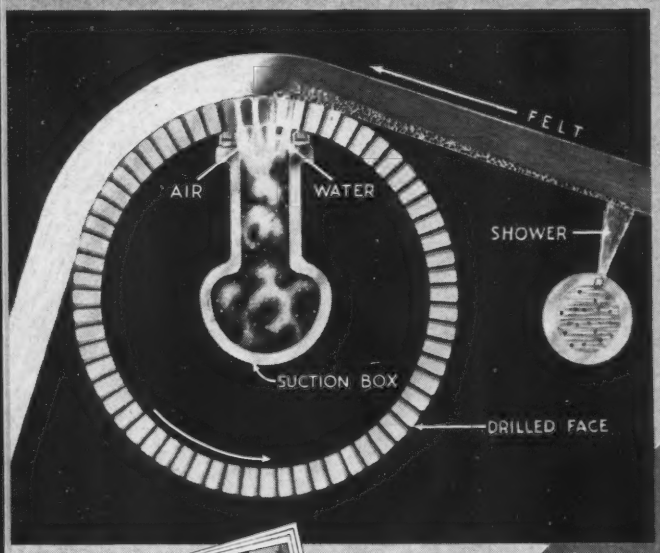
Champion's Triple Program Aims at Better Production
Hyas Fibre Midwest Plant to be Ready by Summer
Marathon Builds Pulp Mill in Ontario Forest

St. Regis Boosts Its Deferiet Output by 37½ Per Cent
Southern Board Starts Mammoth Mill In Georgia
Paper Mill Expansion Projects Fill Rust Schedule

SEE THE "Straight Line" OF FELT CLEANING
IN THE PHOTOGRAPH AT LOWER RIGHT

The sharp, distinct change of felt color from dark to light gray in the photo shows the cleaning and conditioning action of the Downingtown Suction Felt Roll. This is straight across-the-felt-action which you have continuously and with safety. Sectional drawing shows how the roll is installed. It requires no drive travel of the felt turns the roll, which is mounted in anti-friction bearings. Takes only about one-tenth the power consumed by drag of flat boxes. Over 200 now in use

DOWNINGTOWN MFG. CO.
DOWNINGTOWN, PA.



New Catalog
Write for it today

Installation on a 214 inch fourdrinier making machine coated papers.

DOWNINGTOWN
Designers & Builders
Paper Making Machinery

Tough.. Lively ...COOL-RUNNING

War-time Shortage Produced a BETTER RUBBER for TEXROPE V-BELTS

LACK of natural rubber forced the development of synthetic rubbers. And out of this intensive war-time research came a rubber compound that has made today's TEXROPE "Super-7" V-Belts the BEST in 20 years of V-Belt experience!

This war-proved Buna-S develops 75% less internal heat. It's tough, durable, resilient. It cushions, insulates and protects the load-carrying cord structure — adds to the service life of the belt.

HEADQUARTERS FOR V-BELT DRIVES

Your nearest Allis-Chalmers office or dealer offers a COMPLETE line of V-Belt equipment — not only the famous Super-7 belts, but also TEXSTEEL, TEXDRIVE and "MAGIC-GRIP" sheaves, VARI-PITCH sheaves, SPEED CHANGERS, engineering service. Supply *all* your needs from one reliable source. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 2086

5 Super-7 V-Belts ... TO MEET EVERY NEED

Heat-Resisting Super-7
Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.

Oil-Resisting Super-7
Neoprene cover protects core against moderately oily or greasy conditions.

Oil-Proof Super-7
Made of Neoprene throughout. Use it when the belt must swim in oil.

Static-Resisting Super-7
Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

Super-7 Steel
Twin steel cables, to pull extremely heavy loads with minimum stretch.

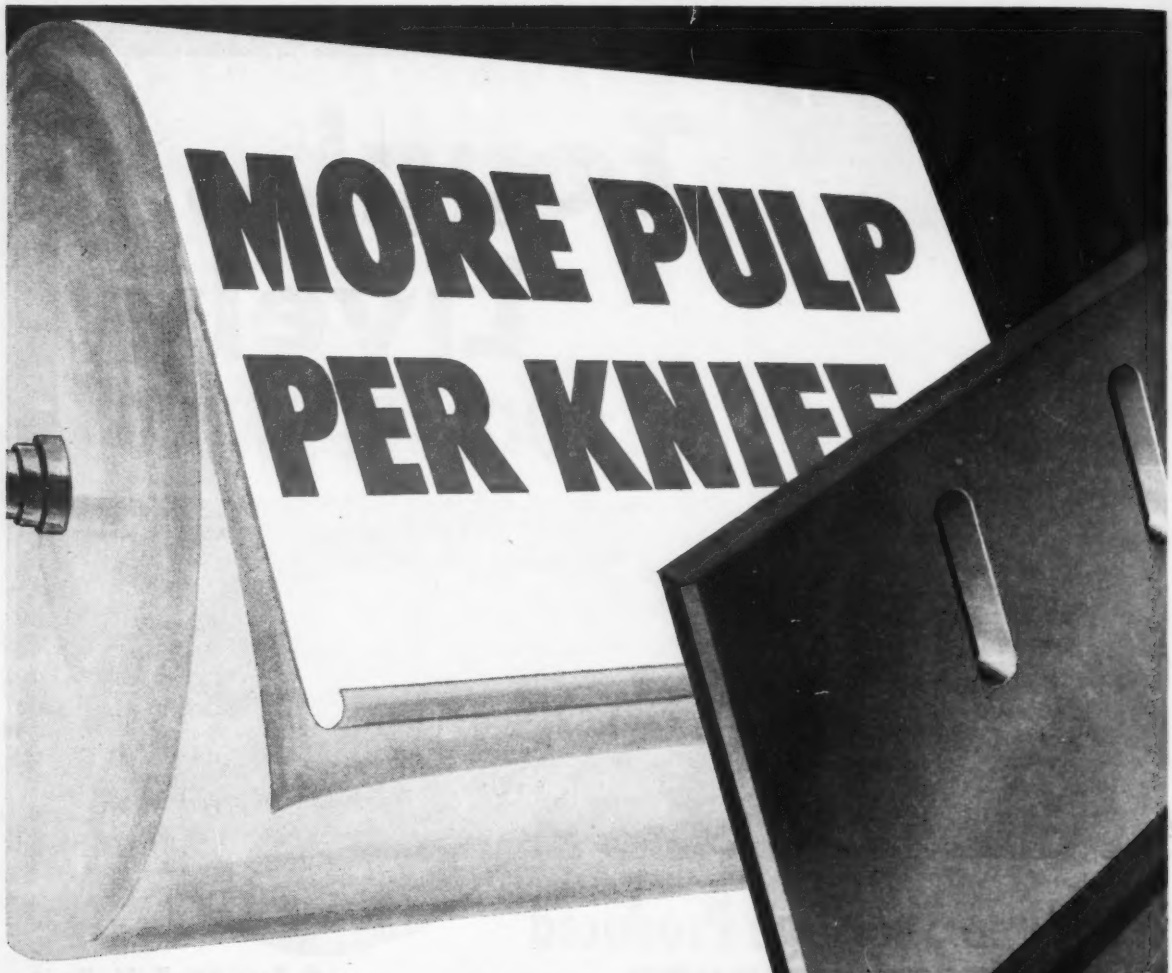
GET THEM — through your Allis-Chalmers district office or dealer.

TEXROPE Super-7 V-Belts result from the co-operative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

TEXROPE V-BELT DRIVES



. . . that's all any Pulp Mill needs to know about

SIMONDS

T-18 CHIPPER KNIVES

These super-sharp knives of Simonds special T-18 steel hold their cutting edges and pour out uniform-sized chips several hours longer than average knives. So percentage of waste is held down. And the cutting edges stand up to heavy cuts at high speeds without cracking or chipping out. Simonds "Red Back" Chipper Knives hold their tempers, too, for they're heat-treated above the heat of the chipper. And they hold their bright, smooth surface, for T-18 steel is highly corrosion-resistant. So for greater production per knife, tell your dealer you want Simonds T-18 Chipper Knives. Or tell the nearest Simonds office.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

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MEISEL MACHINERY IS HELPING IN ALL FIELDS

Cigarette	**Wax**	**Photographic**	**Jet Propulsion**
Condenser	**Grease Proof**	**Snap-out Forms**	**Aero-engine Parts**

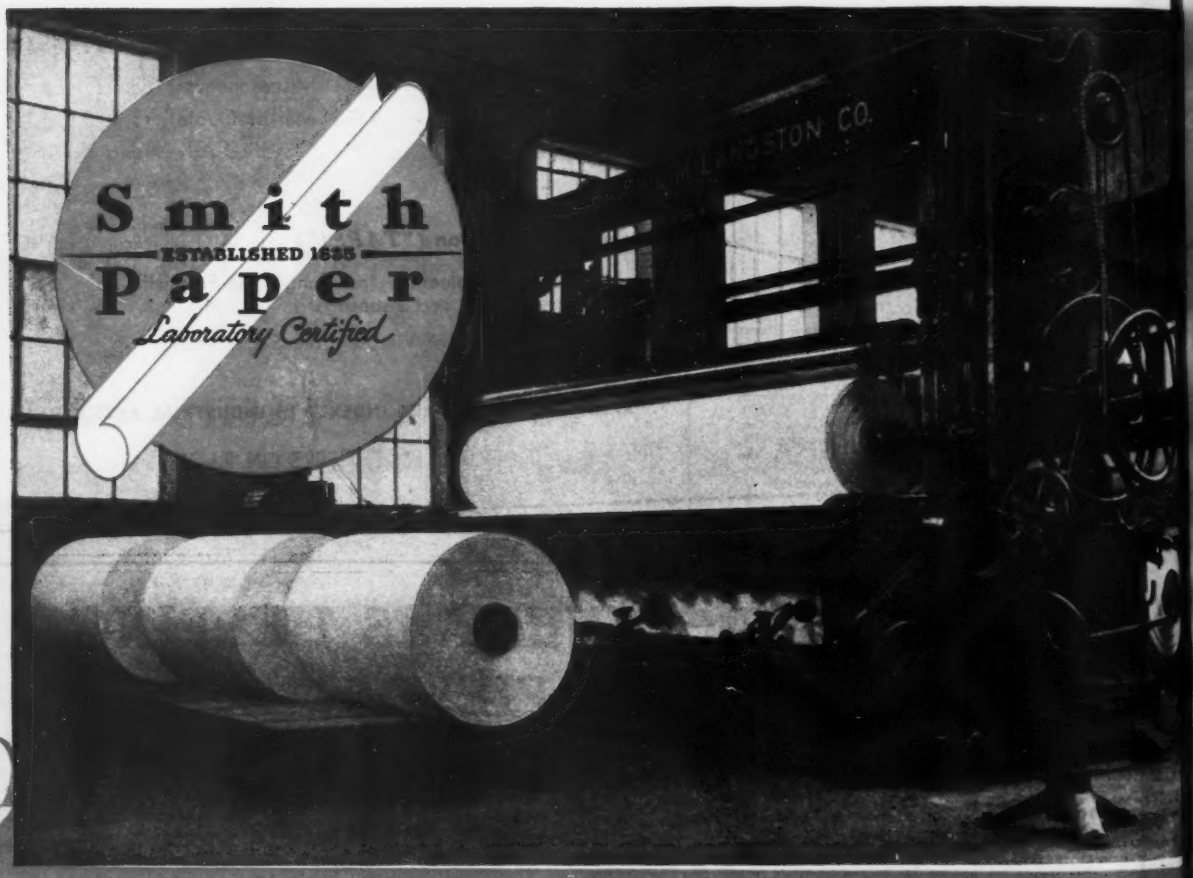
MEISEL PRESS MFG. CO. 950 Dorchester Ave., Boston

Flint and steel have been associated in people's minds for a lot longer than any of us can remember. ***It has been a successful combination.***

So also is the team of Langston and Smith. Langston Slitters help Smith Paper, Inc., to turn out cigarette tissue of the very finest quality. There is no guesswork in that plant, thanks to Smith's 109 years of manufacturing experience, and the use of such dependable and efficient machinery as the Langston Slitter. For a true, clean cut, for rolls of uniform density from core to outside diameter, ***for unbeatable performance, high speed operation and low maintenance, specify Langston.***

SAMUEL M. LANGSTON COMPANY

CAMDEN, NEW JERSEY



Langston SLITTERS AND ROLL WINDERS

SIMPLICITY OF HANDLING...
SAFETY IN APPLICATION...
STABILITY IN STORAGE...

...That's BECCO HYDROGEN PEROXIDE

By far the most important use of hydrogen peroxide is its application as a bleaching agent. Commercial hydrogen peroxide solutions simply diluted with water to a suitable concentration, bleach almost any organic material.

FOR MOST ECONOMICAL USE special groundwood bleaching methods have been developed by BECCO. The amounts of hydrogen peroxide needed for bleaching are small, but the results obtained are outstanding. Some of these are:

1. **Substantially no loss in weight.**
2. **Retention of groundwood's desirable characteristics such as bulk, absorbency, strengths, and formation on the machine.**
3. **High brightness increases.**

Now is the time to investigate the use of Becco Hydrogen Peroxide for groundwood pulp bleaching. Write to:

BECCO

BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL CO., INC.

18 Sawyer Avenue, Buffalo 7, N. Y.

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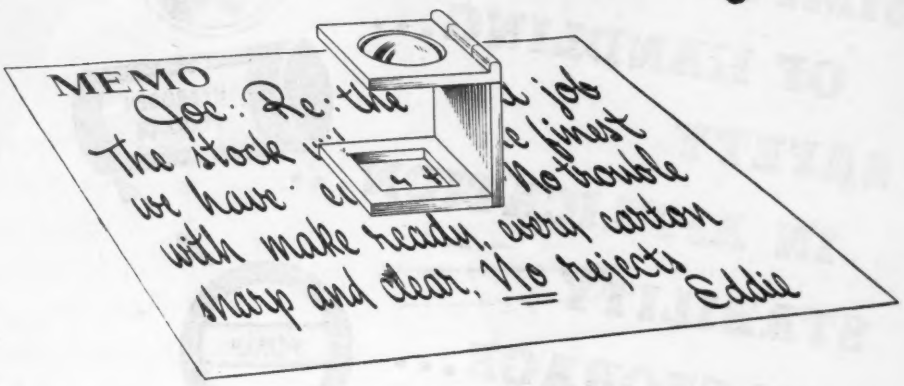
Is *Your* "top" TOPS ?



A perfect "top" on paperboard is easy—when you use Kelgin. This standout algin sizing agent produces a smooth, dense surface . . . insures even penetration of printing inks, oils and waxes. Result—brighter colors, needle-sharp printing.

Kelgin is easy to handle—soluble in either hot or cold water. It prevents sheets from curling, so there's no need to treat both sides. Kelgin won't cause picking, foaming or sticking to the rolls. A highly refined product of nature, Kelgin gives uniformly superior results at a surprisingly economical price. For suggestions on your sizing problems, consult our technical department.

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"Standards of Equipment
for more than thirty years"

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BIRMINGHAM, ALABAMA, U. S. A.

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How does INGACLAD *fit into your picture?*

Look around your plant . . . at your products . . . at your equipment. Wherever stainless steel protection is needed only on the exposed or contact side, *there* is where IngAclad Stainless-Clad Steel fits into your picture. Because IngAclad is 20% solid stainless steel, permanently bonded to a backing of mild steel, it provides all the stainless steel protection you need—for far less than the cost of solid stainless.

Doesn't *that* fit into your picture?

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STAINLESS-CLAD STEEL

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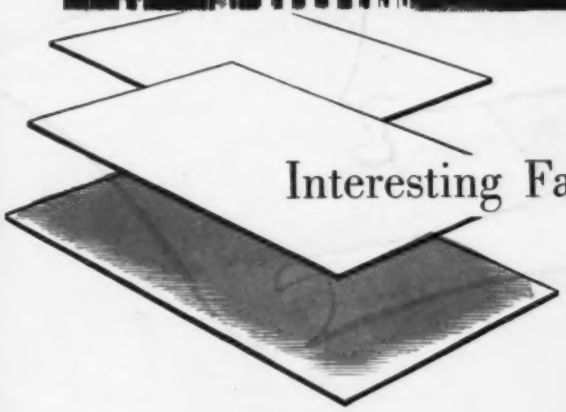
PLANTS: *Chicago, Illinois* • *New Castle, Indiana* • *Kalamazoo, Michigan*



Interesting Facts About Paper

A common paperboard is now being manufactured in Palestine from cotton waste, pulp from banana and orange peels, and the leaves of banana trees.

Interesting Facts About Chrysoidine

Chrysoidine Y is a very popular basic orange, extensively used in coloring kraft, tissue, boxboard, poster, news, and catalog papers. It dyes both sized and unsized papers. Since it has little affinity for bleached stocks, its use should be confined to the unbleached fibers.

Used in conjunction with Green MX Conc. and Methyl Violet 4BPX Conc., it produces shades varying from dull orange to a rich brown. Used with Green MX Conc. or Methylene Blue 2B Conc., it produces olive-green shades.

Chrysoidine Y is widely used in connection with Metanil Yellow MXXX Conc. to produce the conventional container board shades. Chrysoidine RS is a companion color to Chrysoidine Y, but has a somewhat redder shade.

Calco
HELLER & MERZ DEPARTMENT

Heller & Merz Department
CALCO CHEMICAL DIVISION
AMERICAN CYANAMID COMPANY
BOUND BROOK, NEW JERSEY
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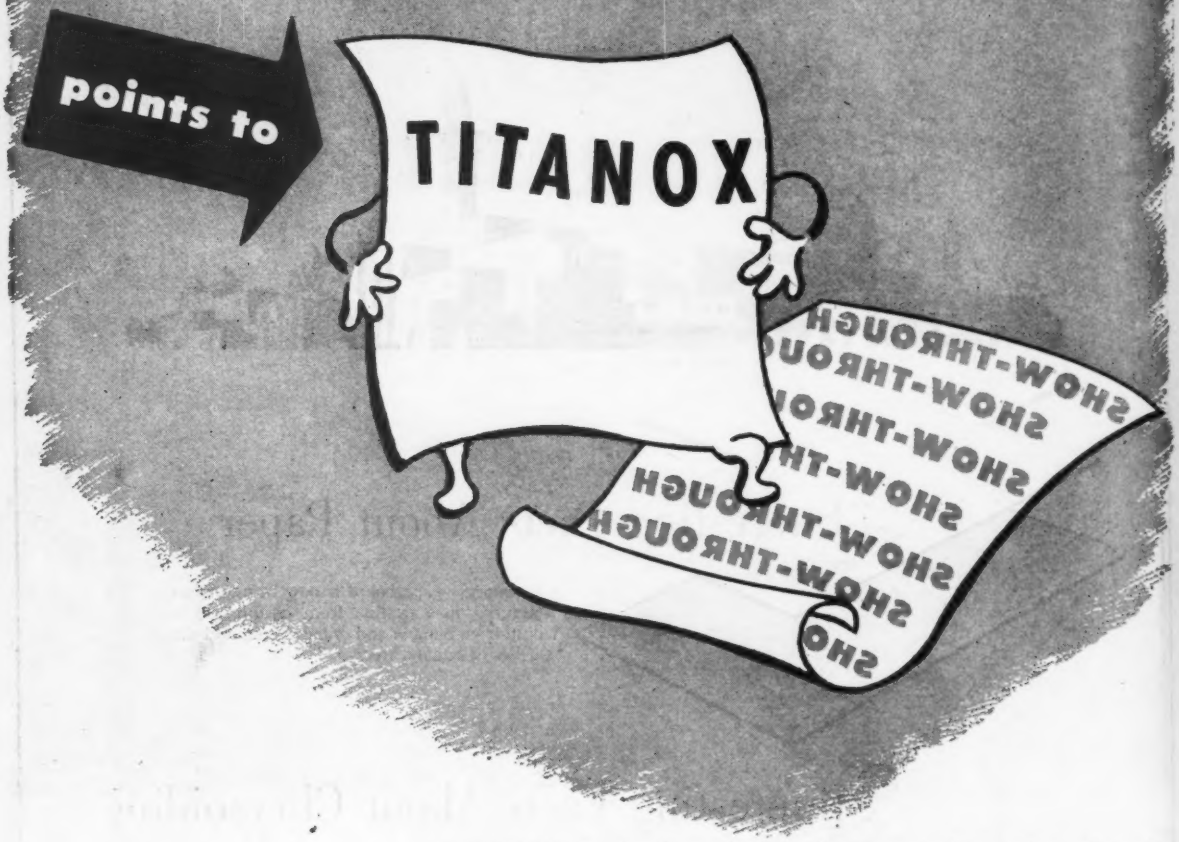
TITANOX ... *the brightest name in titanium pigments*

A SHOWDOWN on "SHOW-THROUGH"



TITANOX is the first choice of paper makers who select their pigments on performance . . . who insist on maximum opacity, brightness, printability and freedom from "show-through".

These benefits are possible with TITANOX pigments because they provide a combination of high refractive index, brightness, neutral white color, as well as fineness and uniformity. Qualities of ready dispersion and good suspension avoid problems in use.

Although the plants that make TITANOX are operating at full capacity, current production is inadequate to supply the greatly augmented demand. You may be sure, however, that steps are being taken to improve this situation as quickly as possible.

TITANOX
TRADE MARK

TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT

111 Broadway, New York 6, N. Y.
104 So. Michigan Ave., Chicago 3, Ill.
350 Townsend St., San Francisco 7, Cal.
2472 Enterprise St., Los Angeles 21, Cal.

"BUT WHAT'S YOUR LAST NAME?"

Our last name is *Koppers*. Many of you know our "children" by their "first names," but do you know their last name?

That is important to us, and it's important to you, too.

Many of you vouch for the extra service you get from Fast's Self-aligning Couplings or American Hammered Piston Rings, or White Tar insecticides or D-H-S-Bronze . . . and don't know that their last name is Koppers. If you know, you are probably disposed to put more than ordinary trust in other products made by Koppers.

Did you know that you can get a Koppers product for coating metal surfaces to prevent corrosion? A Koppers material that makes roofs last longer? Lumber that defies decay and termites? And many other products made with the same skill and originality and inventiveness as those?

So . . . look for this trade-mark which will soon be found on all Koppers products. Here it is.

K
KOPPERS

It is the mark of an organization which is engaged in many phases of engineering, construction, chemistry and coal carbonization . . . is in the forefront of new synthetic developments . . . is an important supplier to the pharmaceutical industry and to many other industries. For top value, look for this mark. Koppers Company, Inc., Koppers Building, Pittsburgh 19, Pennsylvania.

THE INDUSTRY THAT SERVES ALL INDUSTRY

For example . . .
for the manufacturing industries

Among the principal products Koppers provides for the manufacturing industries are:

Pressure-treated lumber which resists decay, termites, marine borers, fire and acid attacks.

Coal tar pitch waterproofing and dampproofing for foundations, retaining walls, etc.

Plastipitch Protected Metal for roofing, siding, gutters, downspouts, etc.

Pitchmastic Flooring Compound.

Tarmac road tar for roads, walks, parking areas, etc.

Bituminous-base paints and coatings.

Fast's Self-aligning Couplings.

Piston Rings for automobiles, diesels, steam engines, compressors, pumps.

Packing for locomotive cylinders and valves.

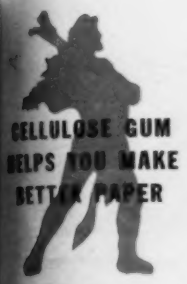
Pipe Dips.

INTRODUCING CMC

IT PAYS TO KNOW *MORE* ABOUT

HERCULES

...A NEW HERCULES PAPER MAKING CHEMICAL



You can improve paper strength and surface properties with Hercules* CMC, a new cellulose gum now being manufactured in commercial quantities for the first time in this country.

Of particular interest to the Paper Industry are two types of CMC. Both are supplied in white, granular powder form. The "Beater" type can be added dry at the beater. It is readily precipitated as the insoluble aluminum salt and improves the strength properties of paper.

"Surface" type CMC can be added at the calender stack or size press and may be used separately or in conjunction with conventional surface treating materials such as starch, wax, and wax resin emulsions. Field tests have indicated this type CMC improves surface characteristics of paper and paper-board. Of particular interest, it increases resistance to penetration of gloss inks, waxes, and oils.

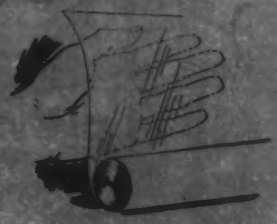
Write us for details on this versatile new Hercules Chemical.

*Reg. U. S. Pat. Off. by Hercules Powder Company

CHEMICAL MATERIALS FOR THE PAPER INDUSTRY

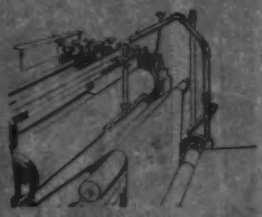
Hercules chemical materials for the paper industry include:

Staybelite* Esters...
Wax additives for coating and laminating processes, modifiers for GRS and Neoprene latices for impregnating and laminating paper and board stocks.



Hercolyn*...
A liquid resin for transparentizing. Possessing excellent fiber-wetting properties, it is useful for the production of transparent and translucent papers.

Chemical Cotton...
Hercules chemical cotton is a pure cellulose, in loose or sheet form. Cleanliness and brightness are outstanding.



Casein...
Hercules casein is used as the binder in clay-coatings, and as an adhesive in laminants and paper converting.

Paracols*...
Water-dispersible wax emulsions used to increase finish, flexibility, printability, and waterproofing of paper.

Chemicals...
These include sulphonated oils, foam killers, eveners, acids, alkalies, alum, and satin white.

FOR FURTHER DETAILS

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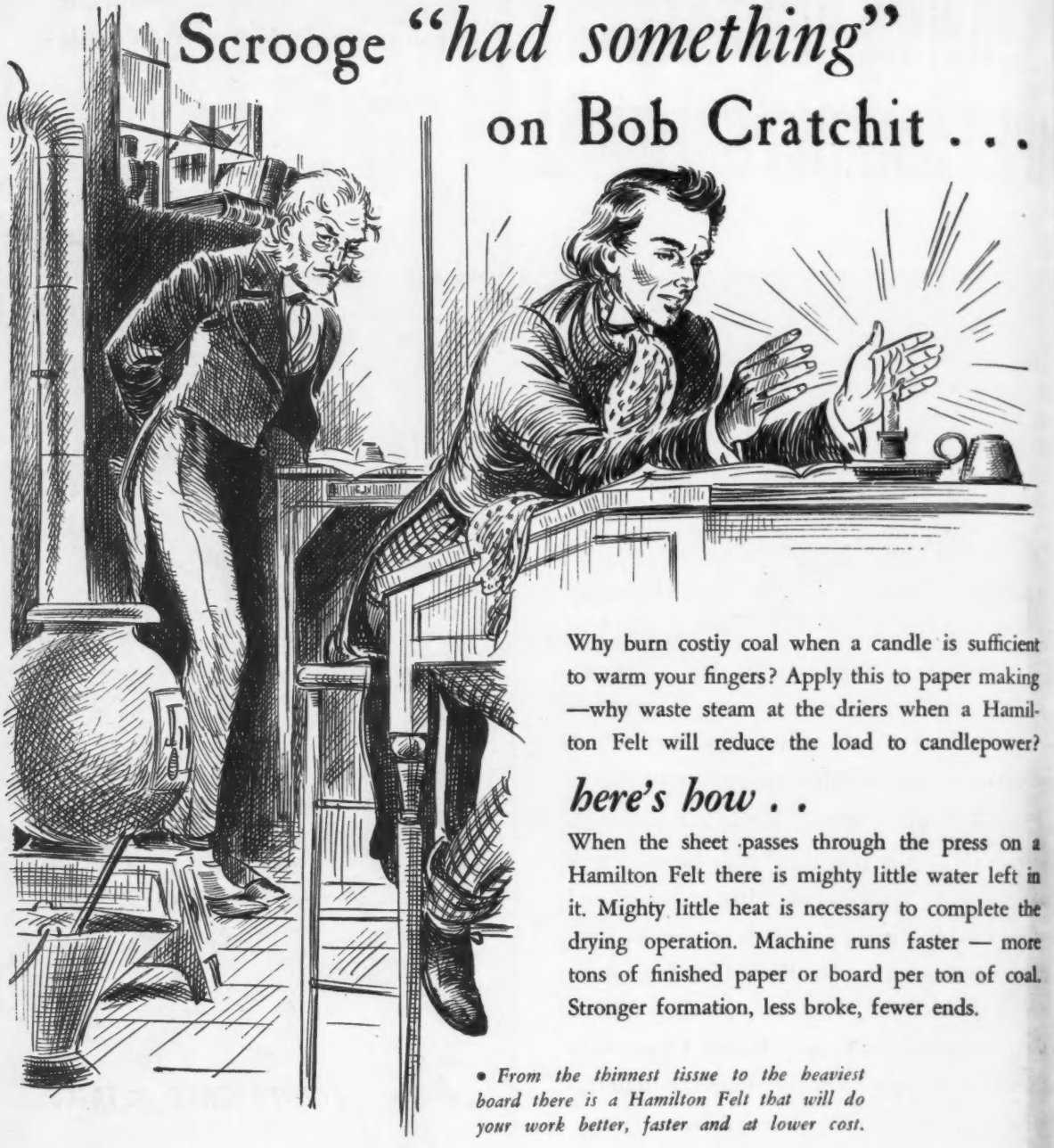
HERCULES POWDER COMPANY
INCORPORATED
962 King Street, Wilmington 99, Delaware

Supply information on CMC ☐
Send me working sample of: Beater type ☐
Surface type ☐

Name _____
Title _____
Company _____
Street _____
City _____ *Zone* _____ *State* _____

P-68

Scrooge *"had something"* on Bob Cratchit . . .



Why burn costly coal when a candle is sufficient to warm your fingers? Apply this to paper making —why waste steam at the driers when a Hamilton Felt will reduce the load to candlepower?

here's how . .

When the sheet passes through the press on a Hamilton Felt there is mighty little water left in it. Mighty little heat is necessary to complete the drying operation. Machine runs faster — more tons of finished paper or board per ton of coal. Stronger formation, less broke, fewer ends.

• *From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.*

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• **Miami Woolen Mills** •

Hamilton Felts

• **Established 1858** •

THE MEAD SALES COMPANY
230 PARK AVENUE, NEW YORK 17, N. Y.
111 W. WASHINGTON STREET, CHICAGO 2, ILL.

MEAD
pulp

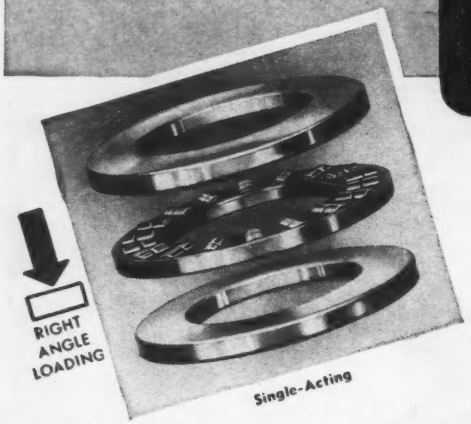
DISTRIBUTORS OF WOOD PULP
BLEACHED AND UNBLEACHED
CHEMICAL AND MECHANICAL WOOD PULP

When Paul Bunyan won the fight with Hels Helson, on the bottom of the upside-down mountain, the remaining debris was known ever after as the Black Hills.

A reproduction of this incident from the fabulous life of Paul Bunyan—the seventh of a series—will be sent on request. It will contain no advertising.

Prevent Wear & Tear under heavy duty thrust loads!..Where service conditions demand the best...Rollway Thrust Bearings stand up!

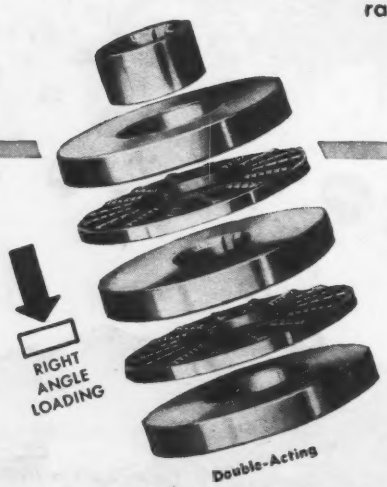
ROLLWAY *precision type*
Roller Thrust Bearings,
the Leader in HEAVY DUTY THRUST UNITS



HERE'S WHY!

1 ROLLWAY carries all loads at right angles to the roller axes.

2 ROLLWAY solid-cylindrical rollers — staggered in position and varied in length, so as to cancel out "tracking" — are accurately spaced in machined-bronze retainers.



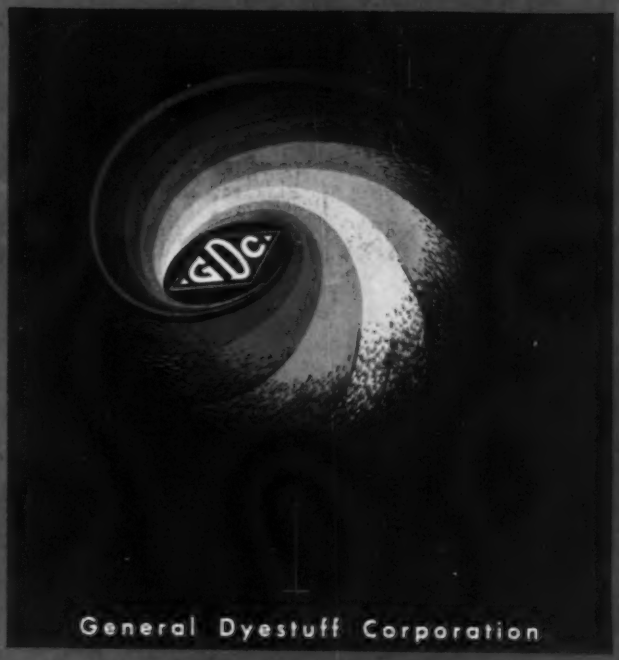
3 Thrust plates, held to extremely close limits of parallelism, afford a linear contact with the straight cylindrical rollers, doing away with Brineil effect and roller "pinch outs" with consequent roller-end wear and rubbing friction.

Six basic types in many sizes to choose from. Send a print or detailed description for free bearing recommendation.

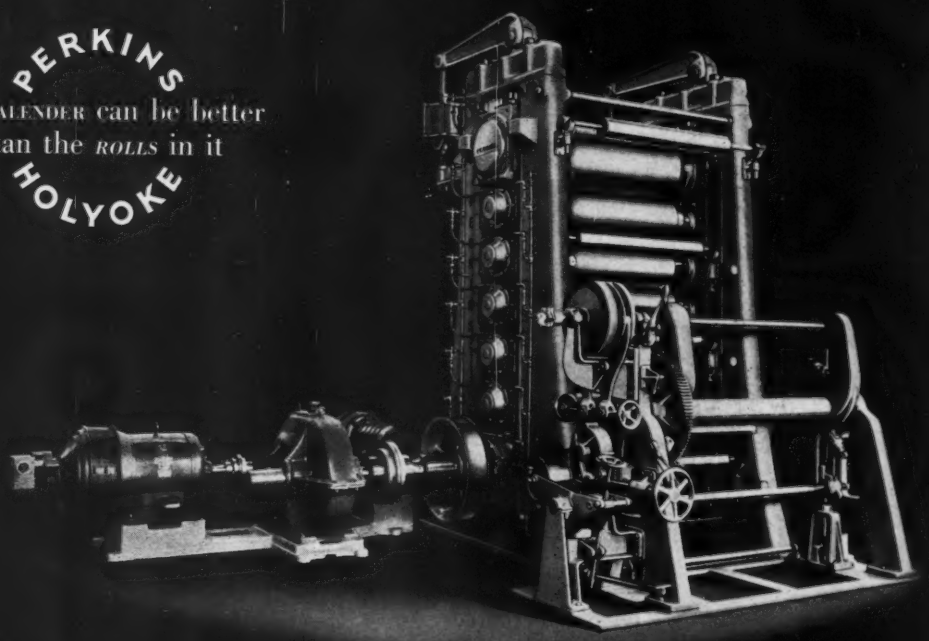
ROLLWAY BEARING COMPANY, Inc., Syracuse 4, N. Y.

ROLLWAY CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Los Angeles

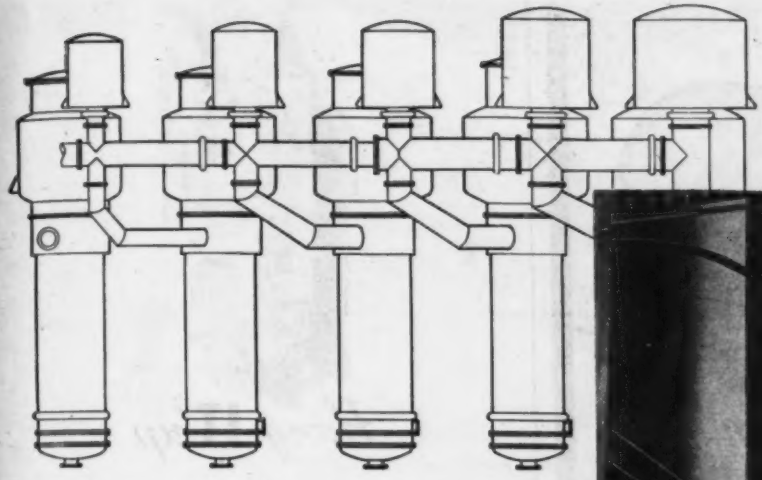

GDc
General Dyestuff Corporation

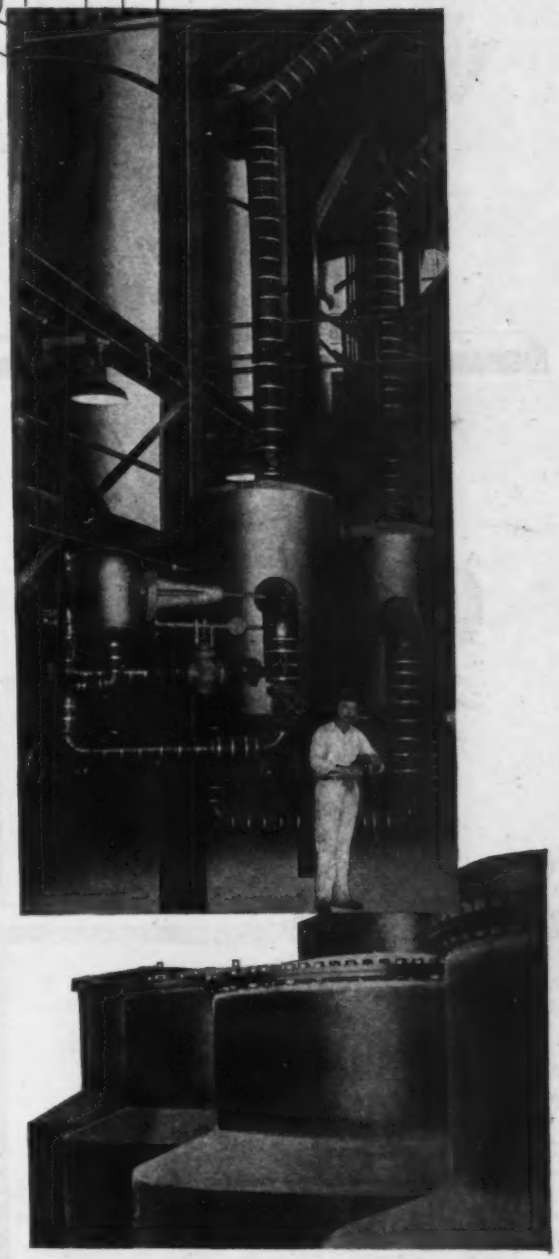
PERKINS
No CALENDER can be better
than the *ROLLS* in it
HOLYOKE



PERKINS

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.
LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD





CONTINUOUS "LOW COST" EVAPORATION

At a well-known Pulp Mill, General American Conkey Multiple Effect Evaporators are today demonstrating their economy in continuous low cost evaporation of sulphate black liquor.

Such economy is assured by features of Conkey design — developed by engineers experienced in pulp mill processes — which cut entrainment losses to the minimum, give high heat transfer, and provide entirely automatic control. Dependable operation of the installation is thus insured, and maintenance and supervision requirements are reduced to the minimum.

If you have an evaporation problem involving the concentration of soda and sulphate black liquors or concentration of sulphite mill waste liquors, get in touch with a General American engineer.

EQUIPMENT FOR PULP & PAPER MILLS

Digesters	Thickeners
Blow Tanks	Storage Tanks
Turbo-Mixers	Bins
Filters	Slakers
Kilns	Recausticizing Plants

General American
TRANSPORTATION CORPORATION
process equipment • steel and alloy plate fabrication
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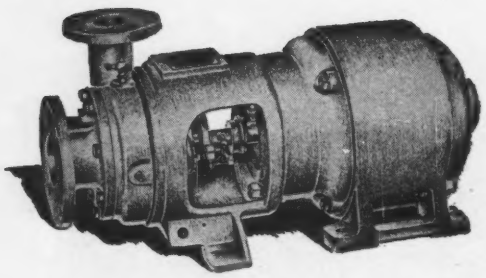
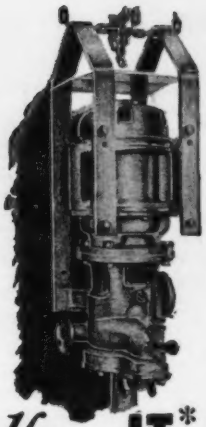
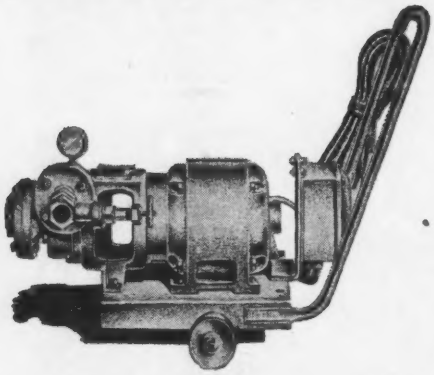
GATX GENERAL AMERICAN



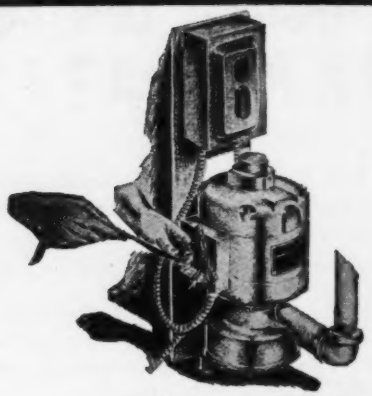
Set **IT*** *down*



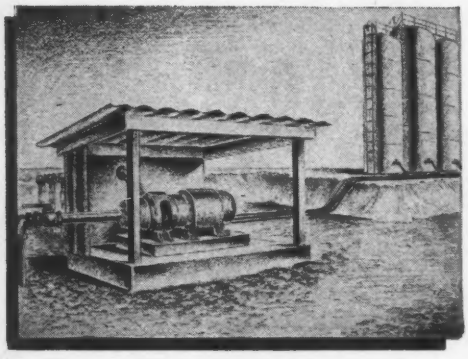
Hang **IT*** *up*



Push **IT*** *around*



Connect **IT***



Leave **IT*** *alone*

*** IT is the MOTORPUMP**

the rugged utility unit that works in any position, is at home in any industry, and takes punishment like a seasoned trouper.

➡ Sizes: ½ to 50 hp; 5 to 1800 gpm; 5 to 600 ft head; . . . . Materials to suit your conditions

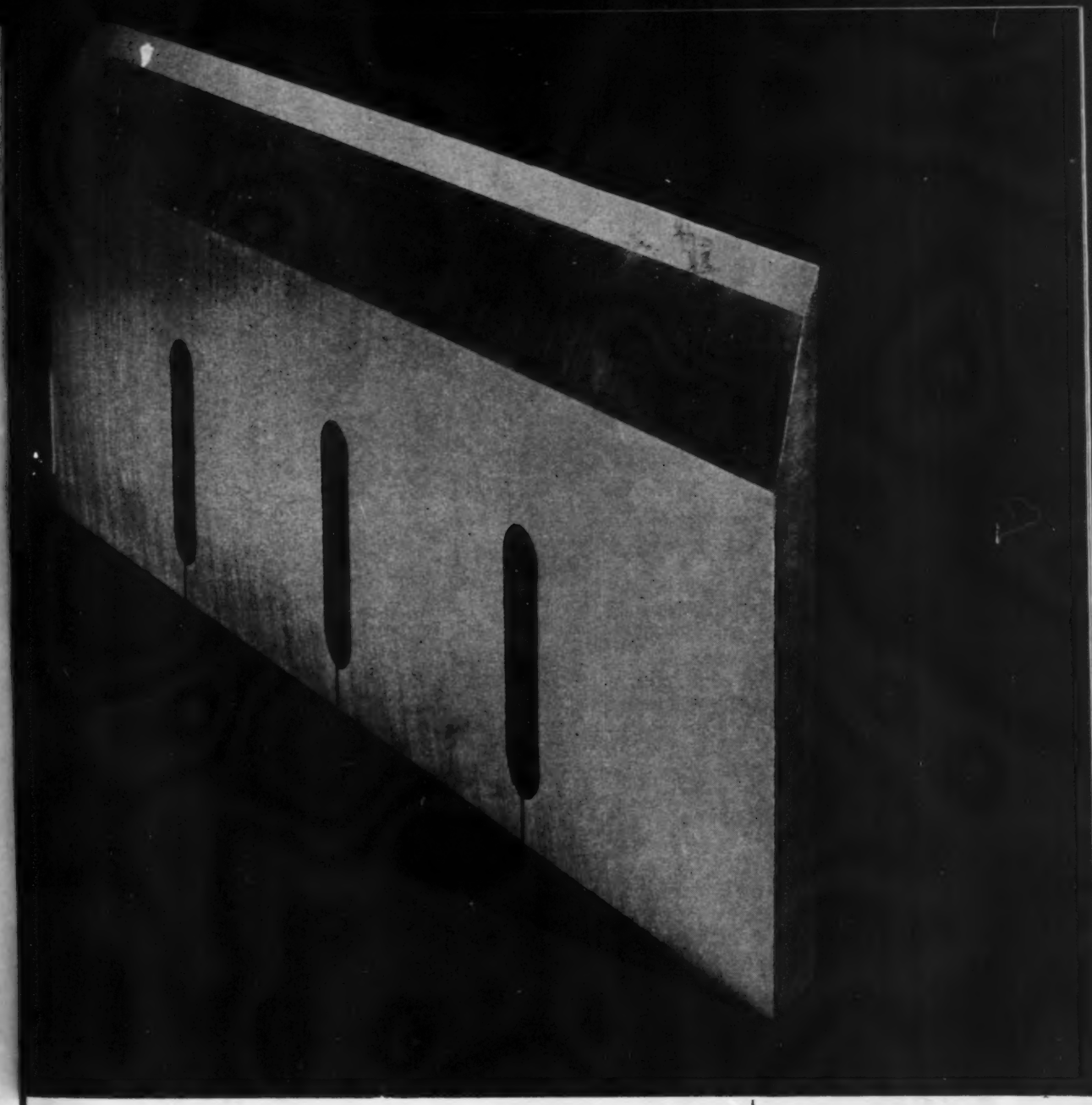
Ask our nearest branch for Form 7093, the Motorpump Catalog.

It's an eye-opener on pump versatility.

Ingersoll-Rand

Cameron Pump Division 9-933

11 Broadway, New York 4, N. Y.



Simple arithmetic dictates

Anyone who adds up the many advantages of using Heppenstall Chipper Knives—mills that keep close check on the cost of chipping logs—must reach one irrefutable answer . . . *Heppenstall E.I.S. Chipper Knives show a unit cost below any other brand on the market.*

This fact has been thoroughly demonstrated over a period of many years and Heppenstall *guarantees* that in *your* mill under *your own* operating conditions, their knives will perform better and more economically than any other make. What more can you ask? Write for quotation. Heppenstall Company, Pittsburgh, Pa.

HEPPENSTALL

E.I.S. CHIPPER KNIVES

BLEACHED SULPHITE PULP manufactured by
Pulp Division, Weyerhaeuser Timber Comp
is a quality product made of West Coast p
wood harvested from Weyerhaeuser timberla

WEYERHAEUSE

For **RELIABILITY**

Ample clearances, high quality workmanship and proved features of design assure reliable operation over long periods of use.

ECONOMY

particularly where steam also is required for heating or process.

SPEED CONTROL

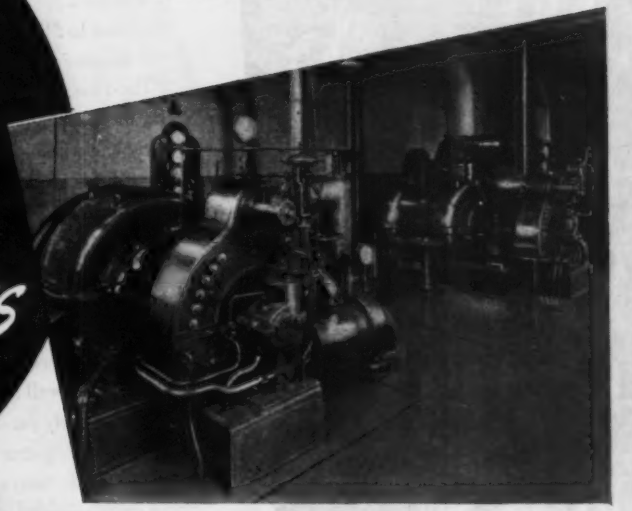
where close regulation and speed variation is desired.

De Laval Class C Velocity Stage Turbine Driving De Laval Boiler Feed Pumps.

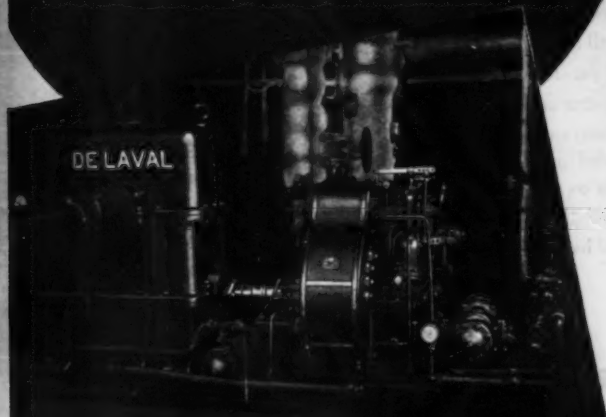
Install

DE LAVAL

SINGLE STAGE TURBINES



De Laval Centrifugal Compressor Driven by De Laval Velocity Stage Turbine. Exhaust Steam from the turbine is used in processes throughout the plant.



Paper Machine Driven by a 225 Horsepower De Laval Velocity Stage Turbine Through De Laval Worm Gear.

T-2

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

DE LAVAL

STEAM TURBINE COMPANY
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"Products fashioned from growing trees to serve essential industries"

what do St. Regis packaging systems have to do with home construction ?

A great deal . . . in the final analysis.

The Rock Products industry has standardized on St. Regis packing machines to fill Multiwall paper bags because the system is efficient and economical.

These manufacturers of cement, lime, plaster and mortar cement rely on heavy-duty Multiwall paper bags to "deliver the goods" . . . safely and without waste.

Cement is used in practically every type of home. Durable, attractive homes are built of stucco and cement blocks . . . and built rapidly. Mortars are essential to the building of brick and stone structures. Most houses . . . stucco, brick, or frame . . . are supported on cement foundations.

This is another example of the importance of St. Regis products to American industry. The essentiality of Multiwall bags in the cement industry . . . as well as for packaging agricultural and chemical products . . . is closely paralleled by that of St. Regis lightweight printing papers in the magazine and catalog fields. In the refrigerator industry leading manufacturers use Panelyte, the St. Regis paper base laminated plastic, molded inner door frames.

Starting with its own timber land, St. Regis is producing a wide range of wood cellulose products essential to 21 basic American industries. Demand has necessitated broad expansion in all divisions of the company.

ST. REGIS PAPER *Company*

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St. Regis Products are sold by St. Regis Sales Corporation:
Offices in NEW YORK · CHICAGO · BALTIMORE · SAN FRANCISCO and 20 other industrial centers
IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal

PRODUCTS: St. Regis "Tacoma" bleached and unbleached sulphate pulp . . . Multiwall Bags and Bag-filling Machines . . . Printing, Publication and Specialty Papers . . . Panelyte — The St. Regis Structural Laminated Plastic.

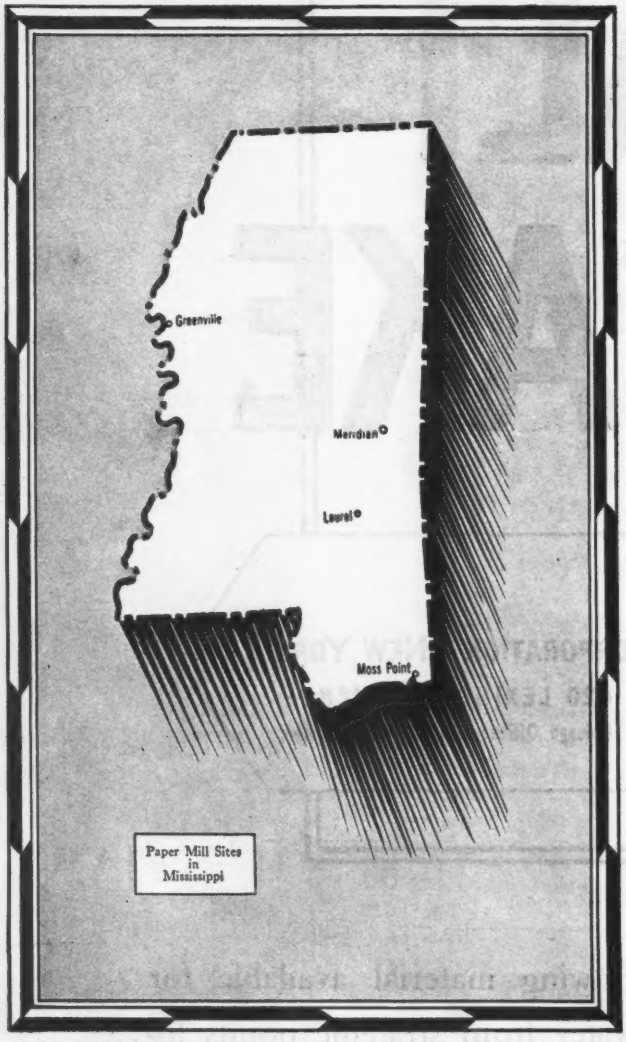
SALT CAKE

High quality, free-flowing material available for shipment by rail or water from strategic points located in the East, Middle West, and on the Gulf Coast.

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 25 PUBLISHED BY DRAPER BROTHERS COMPANY · CANTON, MASSACHUSETTS



Map copyright by L. D. Post, Inc., New York, N. Y. American Map Co., New York, N. Y.

HIGH LIGHTS:

Mississippi, another recent paper making state, is in a position to make helpful contributions to alleviate the building shortage. With the exception of one company which is a big factor in the production of bleached kraft and bleached machine glazed specialties, its mills are concentrating upon building and industrial paperboard.

One makes insulating and hard board, another wood fibre and general purpose boards and a third, wood fibre insulation and structural board.

Such products have proven their economy and utility during the war in the speedy fabrication of army barracks, USO clubhouses and their like. The rated daily capacity for all of Mississippi's paper mills is given as 1,095 tons in Post's Paper Mill Directory for 1945.

Draper Felts for Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

Canton, Massachusetts

RALPH E. BRIGGS Sales Manager

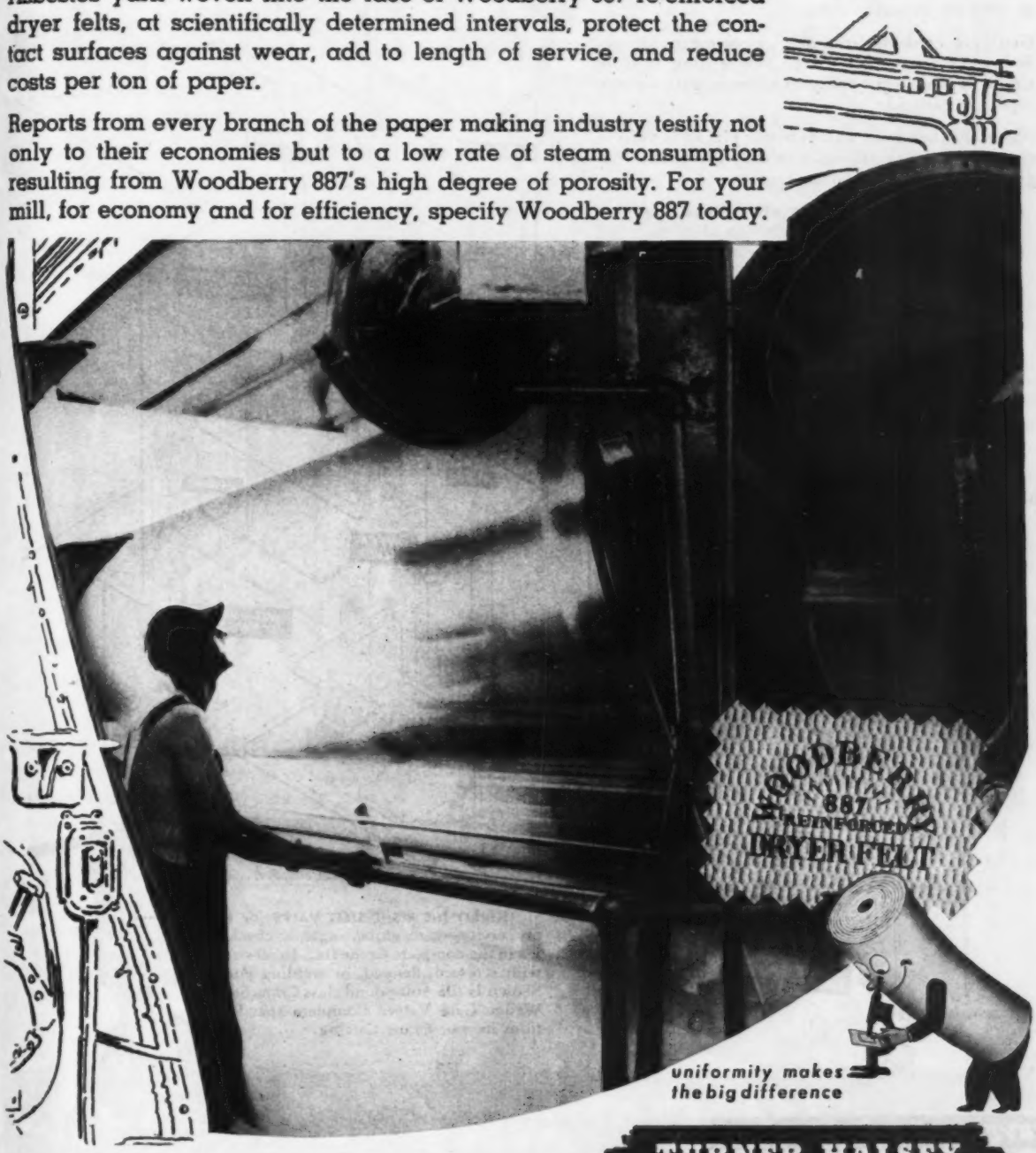
BRADFORD WEST, PITTSFIELD, MASS. · WILLIAM N. CONNOR Jr., CANTON, MASS. · L. H. BREYFOGLE, KALAMAZOO, MICH. · L. L. GRIFFITHS, Jr., KALAMAZOO, MICH.

Lowered Costs Through Longer Wear

Leading paper mills throughout the country are experiencing important savings in their dryer felt costs with Woodberry 887.

Asbestos yarn woven into the face of Woodberry 887 re-enforced dryer felts, at scientifically determined intervals, protect the contact surfaces against wear, add to length of service, and reduce costs per ton of paper.

Reports from every branch of the paper making industry testify not only to their economies but to a low rate of steam consumption resulting from Woodberry 887's high degree of porosity. For your mill, for economy and for efficiency, specify Woodberry 887 today.



uniformity makes the big difference

Mt. Vernon-Woodberry Mills

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Better Piping . . . the Easier Way

Crane Supplies Everything

ONE SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

Ask piping men in any field. They all have the same reasons for standardizing on Crane Equipment. Makes the whole job easier, they say, from design to erection to maintenance work.

Getting everything from one source means simplified specifying and buying. And getting it from Crane assures top quality in all materials for any piping installation.

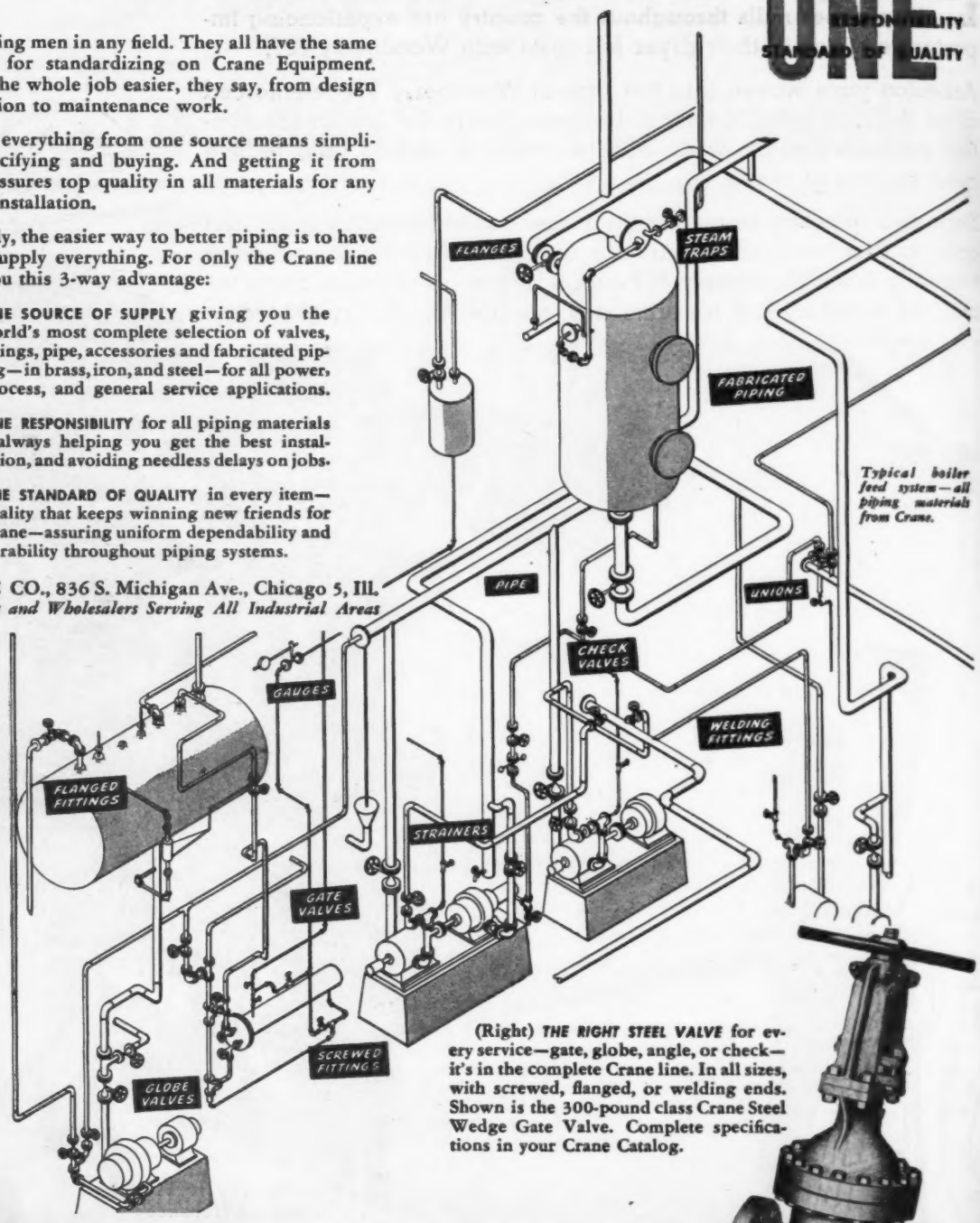
Naturally, the easier way to better piping is to have Crane supply everything. For only the Crane line gives you this 3-way advantage:

ONE SOURCE OF SUPPLY giving you the world's most complete selection of valves, fittings, pipe, accessories and fabricated piping—in brass, iron, and steel—for all power, process, and general service applications.

ONE RESPONSIBILITY for all piping materials—always helping you get the best installation, and avoiding needless delays on jobs.

ONE STANDARD OF QUALITY in every item—quality that keeps winning new friends for Crane—assuring uniform dependability and durability throughout piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas



Typical boiler feed system—all piping materials from Crane.

(Right) ***THE RIGHT STEEL VALVE*** for every service—gate, globe, angle, or check—it's in the complete Crane line. In all sizes, with screwed, flanged, or welding ends. Shown is the 300-pound class Crane Steel Wedge Gate Valve. Complete specifications in your Crane Catalog.

EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
HEATING • PUMPS

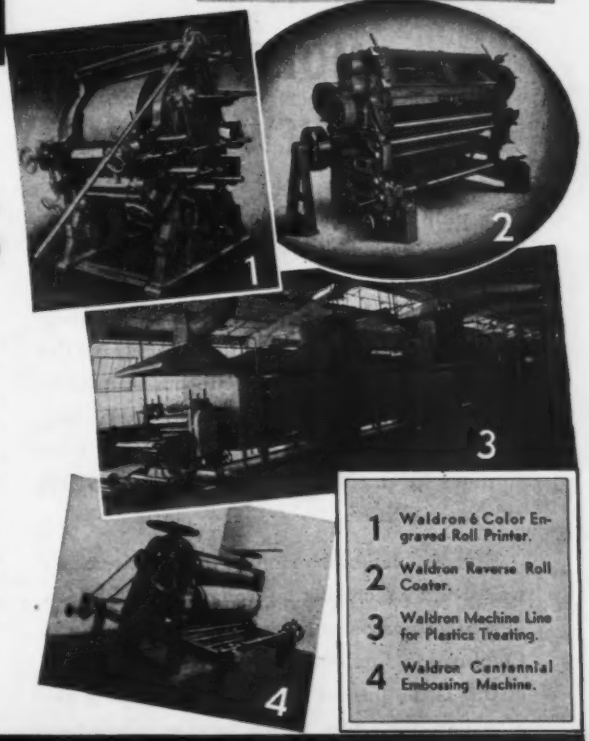
CRANE

FOR EVERY PIPING SYSTEM

WALDRON *Processing* MACHINES

Part of the pictures of the many famous new products being introduced are the WALDRON machines used in their processing. Converting webs of raw stock into the hundreds of new fascinating finished products is the job usually entrusted to the modern WALDRON processing machines—designed and built by an organization that knows the problems and possibilities in modern processing operations.

Our capable Research and Development Staff with complete testing equipment at its command is available for aiding development executives to determine the most efficient method of processing from raw stock to finished product. Inquiries will be treated in strictest confidence. Investigate the possibilities.



1 Waldron 6 Color Engraved Roll Printer.
2 Waldron Reverse Roll Coater.
3 Waldron Machine Line for Plastics Treating.
4 Waldron Centennial Embossing Machine.

Coating Machines
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Embossing Machines
Flour Cov. Machines
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BUILDERS OF QUALITY MACHINES SINCE 1827

The Paper Industry Selects the... VU UNIT

MORE THAN 3,000,000 LB OF NEW CAPACITY SINCE VJ DAY

The pulp and paper industry had little or no opportunity to add new equipment or rehabilitate its plants during the war. Although called upon to supply paper products in fabulous quantities, the paper mills did not receive the priorities demanded by producers of planes, guns, tanks, and other armament. So VJ Day became *D Day* in the paper industry — the time to move in quickly, build new plants, revamp existing facilities.

High in demand among mill requirements was steam generating equipment, and high in demand among steam generators available was Combustion Engineering's VU Unit. Evidence of this is the partial list, on the opposite page, of paper companies which have purchased or installed VU Steam Generators since VJ Day.

This list includes units ranging in capacity from 45,000 to 200,000 lb of steam per hr with pressures up to 1000 psi and steam temperatures to 825 F. The versatility of the VU Unit is evidenced by the fact that these units are fired with pulverized coal, oil, gas, stokers and some with bark burning furnaces.

The popularity of the VU Steam Generator in the pulp and paper industry is characteristic of the attitude toward this modern unit displayed by industry generally. Proof of this is that the capacity of VU Units ordered since VJ Day has averaged more than a million pounds per month.

A-999

C-E

COMBUSTION

C-E PRODUCTS FOR THE PAPER INDUSTRY INCLUDE STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; ALSO MANY TYPES OF PRESSURE VESSELS.

Partial List of VU STEAM GENERATORS For the Paper Industry Ordered or Installed Since VJ Day

Name and Location	No. of Units	Capacity — Lb of steam per hour	Design Press. psi	Total Steam Temp. °F	Method of Firing
Canadian International Paper Co., Gatineau, Quebec	1	200,000	250	435	Pulv. Fuel
Southland Paper Mills, Inc., Herty, Texas	2	175,000	675	750	Gas
Scott Paper Co., Chester, Pa.	1	170,000	1000	760	Pulv. Fuel
S. D. Warren Co., Cumberland Mills, Me.	2	160,000	600	725	Pulv. Fuel
Macon Kraft Co., Macon, Ga.	2	150,000	925	825	Pulv. Fuel
Allied Paper Mills, Kalamazoo, Mich.	1	150,000	700	760	Pulv. Fuel
Minnesota & Ontario Paper Co., International Falls, Minn.	1	150,000	475	580	Pulv. Fuel
Hammermill Paper Co., Erie, Pa.	2	125,000	725	775	Pulv. Fuel
Southern Paperboard Corp., Port Wentworth, Ga.	2	120,000	675	700	Oil
Nekoosa-Edwards Paper Co., Nekoosa, Wisc.	1	110,000	475	700	Pulv. Fuel
Macon Kraft Co., Macon, Ga.	1	100,000	925	825	Bark
St. Regis Paper Co., Deferiet, N. Y.	2	100,000	875	825	Pulv. Fuel
Container Corp. of America, Fernadina, Fla.	1	100,000	675	750	Oil
Canadian International Paper Co., Hawkesbury, Ontario	1	100,000	250	465	Pulv. Fuel
Kalamazoo Vegetable Parchment Co., Espanola, Ontario	1	100,000	250	450	Pulv. Fuel
Southern Paperboard Corp., Port Wentworth, Ga.	1	96,500	675	700	Bark & Oil
United Paperboard Co., Inc., Lockport, N. Y.	1	80,000	450	...	Stoker
Canadian International Paper Co., Temiskaming, Quebec	1	75,000	475	466	Pulv. Fuel
Chemical Paper Mfg. Co., Holyoke, Mass.	1	60,000	450	625	Pulv. Fuel
The Northwest Paper Co., Brainard, Minn.	1	45,000	225	...	Stoker

ENGINEERING

200 MADISON AVENUE, NEW YORK 16, N. Y.

"We can depend on your adhesives..."

In the making of set-up paper boxes, the strength—and even the appearance—of the finished product can be affected by the choice of adhesives. The F. J. Schleicher Paper Box Co. of St. Louis—some of whose attractive "Masterbuilt" boxes are pictured here—made their choice . . . Arabol.

That they are satisfied with this decision is evident from their statement: "We have been using Arabol for years and it always does the job. We can depend on your adhesives to help us produce quality boxes."

For more than 60 years we have provided specific adhesives to handle specific tasks. Today we serve the leaders in a hundred industries. Consult us and put the knowledge gained from this specialized experience to work for you. Whatever your adhesives problems, the technicians in our laboratories are equipped to help you find the solution. See the Arabol Representative when he calls; he knows adhesives.

THE ARABOL MANUFACTURING CO.

Executive Offices: **110 East 42nd St., New York 17, N. Y.**

CHICAGO—54th Ave. & 18th St. • SAN FRANCISCO—30 Sterling St.

Branches in Principal Cities

Factories in Brooklyn, Cicero, San Francisco

Adhesives?... **ARABOL!**

IMMEDIATE DELIVERY

STAINLESS STEEL

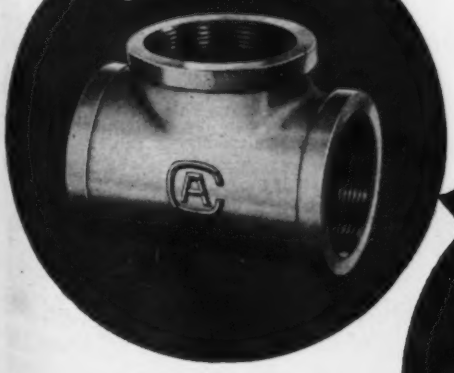
COOPER ALLOY

WELDING FITTINGS

* SEAMLESS FORGED

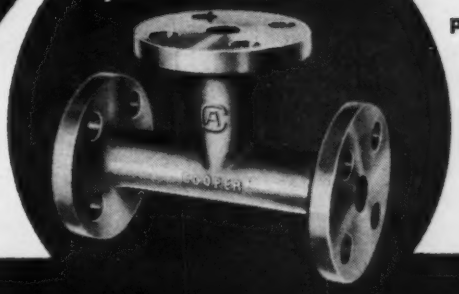
* PRESSED and WELDED

STAINLESS STEEL SCREWED FITTINGS



Cooper offers a complete line of Stainless Steel Welding Fittings including 45°, 90° and 180° elbows, tees, caps, reducers and lap joint stub ends. Each are annealed, sandblasted and passivated for maximum corrosion, abrasion and heat resisting characteristics. The unusual performance of these fittings is the result of Cooper's 25 years of Stainless Steel "know-how."

STAINLESS STEEL FLANGED FITTINGS



PAPER · · · America's 6th Industry

FACIAL TISSUES FOR AUTO WINDSHIELDS

(NOTE: *A leading chain of service stations is using paper polishing cloths in place of cotton rags.*)

Specially-treated tissues that leave no lint are being used to polish automobile windshields. Because of added tensile and folding strength, these soft paper polishing cloths can stand up under punishment until fully saturated; take the place of two or three ordinary paper towels. Paper "wipe" is equally serviceable, wet or dry. Costs less than cloth, and requires less storage space.

This new development in paper-making is fully described in a 12-page book entitled "Windshield Wiping Service" which is yours for the asking.

Paper dust cloths . . . paper dish rags . . . paper sheets and pillow cases . . . New uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for book and high grade printing papers, one for white paper for bags, and one for Kraft liner board; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

PAPER TRADE JOURNAL

December 5, 1946 Vol. 123, No. 23

Title Reg. U. S. Pat. Off.

Tinker Testifies at Paper Investigation

NEW YORK—E. W. Tinker, executive secretary of the American Paper and Pulp Association last week presented some hard reassuring facts before an investigation at Washington into the conditions of the market for paper. The Government, anxious to learn why it cannot readily get all of the paper that it demands, learned from the paper industry spokesman that, far from a shortage there is actually an increased production, that the current year may see a record of 19 million tons or more produced, and that the present straitened condition of the market is due to an excessive demand.

Mr. Tinker went on to point out that, under existing laws with their threat of prosecution for any attempt at cooperative action among bidders, it has been impossible for the industry as a body to initiate any movement that would assure Government as a customer any preferred position. This has left the bidding for government business open for such firms as found it possible to undertake any portion of the business.

Mr. Tinker's statement follows:

"The fact that a meeting of Government agencies has been called for the consideration of ways and means to conserve paper, I presume, carries the inference that there is extravagant use of paper on the part of Government agencies. Perhaps this inference was justified in some degree during the period of the war and during the life of emergency agencies. I have no doubt that even in the peacetime economy many government bulletins of limited usage are issued and perhaps in instances too many carbon copies are required. However, in a vast complicated pattern of an organizational structure such as the Federal Government, it is all too easy for the average taxpayer to criticize governmental departments when a large percentage of their business requiring paper is in fact done directly or indirectly under mandates of the Congress. The necessity of maintaining records and, in fact, the efficient use of man-power, which are related, are dependent upon the use of paper. I suggest that if economy is the objective, from my own experience the use of the written word rather than the long distance telephone might be prescribed. At least it has been my experience that

(Continued on page 42)

Canada Counts Prospect of More Pulpwood, Higher Prices

TORONTO — While the overall prospects for Canadian pulpwood production this season indicate that last year's record of eight million cords may be exceeded, Ontario production seems likely to fall a little beow former performances. A 19-day strike of bush workers last month is expected to have a decided effect on the total production for this province this season. Added to this is the fact that operators in Ontario have been unable to replace the 4,500 German prisoners of war who have now been sent home.

There are said to be 55,000 men presently employed in pulpwood cutting East of the Rockies and this force is expected to reach 65,000 by the middle of December, as against 58,000 men employed at that time last year. An additional 13,000 men are now employed on cutting wood which wil eventually be purchased by domesti mills and another 13,000 men are nov cutting pulpwood for export. Industria employment in the urban centers i running well above normal peace-tim figures; mining is active; and in spit of the fact that Canada has accepte more than 30,000 Poles who decline to return to their native land after th war was over, farm help is still i short supply.

Prices on all grades of wood pul are to be advanced substantially a from the beginning of the new yea according to informed circles. Thi would include bleached and unbleache sulphite pulp, bleached and unbleache pulp and probably groundwood o "mechanical" pulp. Such increase would benefit practically every news print mill in Canada, as they all have surplus pulps for sale not required for manufacturing into papers or paperboard; as well as other members of the pulp and paper industry, such as Bathurst, B. C. Pulp and Paper, Fraser Companies and Howard Smith Paper Mills and Brown Company, at least through Brown Corporation, its Canadian subsidiary, producer of bleached and unbleached sulphate pulp. Among specific increases mentioned as probable are at least $5 a ton for unbleached sulphate pulp, with $6 for unbleached sulphite pulp and as high as $10 for bleached sulphite pulp.

Chicago Paper Men Give $1,200 To Institute at Appleton

CHICAGO—The treasury of the Institute of Paper Chemistry was enriched last week by $1,200 as the Chicago Paper Association presented this amount to Dr. Westbrooke Steele, director, in recognition of the splendid work the Institute has done for the entire paper trade. The Chicago Paper Association, with William Knox as the head, dedicated the proceeds of its annual golf party and outing last Fall to the Institute, and it is reported that the $1,200 came from that source. The money is to be used to serve as a year's contribution to the scholarship fund of the Wisconsin school.

St. Regis Elects Seven To Sales Subsidiary

NEW YORK—Roy K. Ferguson, president of the St. Regis Paper Company, has reported the election of seven new officers of the St. Regis Sales Corporation, the company's sales subsidiary. They are: Mason F. Ford, executive vice-president and South American manager; Thomas H. Cosford, executive vice-president and Canadian manager; Reginald L. Vayo, executive vice-president and director of sales of Kraft pulp; William H. Anders, executive vice-president and manager of the Nashua River division; Edgar Hoppe, vice-president and European manager; Burton A. Ford, vice-president, Multiwall bag division; and C. A. Brothman, comptroller.

Box Plant Plans to Locate in Georgia

CEDARTOWN, Ga. — Park-Sunbeam Folding Box Company of New York has completed plans to locate a southern branch in Cedartown to take care of the trade in this area. H. Horowitz, president and Louis Noumoff treasurer of the company were in Cedartown recently to complete negotiations. The boxes and bags made by this company are used primarily in ladies' apparel shops. Indications are that the plant will cover about 60,000 square feet and will be located near the Central of Georgia Railroad.

Gamble and His Wife Buy Brownville Board

WATERTOWN, N. Y. — Brownville Board Company, Inc., has been formed to acquire the property, rights, privileges, franchises, and good-will of the Brownville Board Company, a long established company founded in 1898 by J. Munson Gamble and presently headed by his son, Willard S. Gamble.

The new corporation is solely owned and controlled by Willard S. Gamble and his wife, Ann B. Gamble, and will continue under Mr. Gamble as president. Other officers of the new corporation: Robert J. Nichols, vice-president; Ann B. Gamble, secretary; and B. Quinn Hanchette, treasurer. With the exception of Mrs. Gamble, all have been active in the management of the Brownville Board Company for many years.

Control of the company was held by J. Munson Gamble's children, after Mr. Gamble's retirement, and his son, Willard S. Gamble, assumed presidency at that time. Now ownership of the business is passing from other members of his family to Willard S. Gamble and his wife, Ann B. Gamble. Since the management will remain the same, it is expected that there will be no change in operating policy. The Brownville Board Company, Inc., will continue to serve the customers of the old company, many of whom have been been on its books since the turn of the century.

The Lewis-Brownville Sales, Inc., 270 Broadway, New York, will continue as selling agent of the company.

Michigan Superintendents Meet December 16

KALAMAZOO—The Michigan Division of the American Pulp and Paper Mill Superintendents Association will meet on Thursday, December 19, at the Park-American hotel, Kalamazoo. Dinner will be served at 6:30 P. M.

An unusual program on screening has been prepared. Qualified representatives of Allis-Chalmers Mfg. Company, Sandy Hill Iron and Brass Works and Shartle Brothers Machine Company will present talks on their respective approaches to the screening problem. Ralph Atkins, superintendent of Lee Paper Company and past-chairman of the section, will be honored with a certificate of appreciation for his services.

Consolidated Foremen Present Diesburg a Gift

WISCONSIN RAPIDS, Wis. — A life membership and gift were presented to Peter Diesburg, retired pipe fitter foreman of the Consolidated Water Power and Paper Company Thursday evening, November 21, at a dinner meeting of the Consolidated Foreman's Club, of which Mr. Diesburg is a charter member. The presentation was made by Earl F. Otto, superintendent of maintenance and stores

Harold Larson was elected president of the club; William O'Gara, vice-president, and W. C. Hofmann, re-elected secretary and treasurer. It was decided to change the name of the organization to the Consolidated Club.

Mr. Otto also paid tribute to William J. White, who left Consolitated recently for Tucson, Ariz. He worked in the mechanical department.

After the dinner, the group was entertained by Donald Purdy, Appleton, sleight-of-hand artist.

Deferiet Considers Taking Pine Camp Housing

DEFERIET, N. Y.—The incorporated village of Deferiet, with the support of the St. Regis Paper Company, is considering the possibility of applying for trusteeship of 160 housing units at nearby Pine Camp to insure continued operation of that area for civilian tenants. Conferences on the matter have been held recently by Clifford C. Wenzel, personnel manager of the St. Regis plant, with Frank Reynolds, mayor of Deferiet. No definite action has been taken by the village board or the St. Regis plant and the proposal to take over Pine Camp's 160 excess housing units is still in the preliminary stage.

Gerlach Uses Graphs To Explain Safety

MENASHA, Wis. — Use of safety graphs was demonstrated by Carl Gerlach of Kimberly-Clark Corporation at the second monthly meeting of the Twin City Safety Council for foremen and supervisors. Sixty-five persons attended the meeting Wednesday evening, November 20, at Germania hall. The graphs are of special value for employe training programs, inasmuch as they stimulate discussion from all present. Of special interest at the meeting was a graph on correct lifting and materials handling, because one out of five accidents in industry is caused by incorrect methods.

Gilbert Opens Cafeteria

MENASHA, Wis.—The Gilbert Paper Company opened its new cafeteria for employes Monday noon, November 25, with more than 125 persons being fed. The cafeteria is on the ground floor of the new wing of the paper mill and overlooks the Fox river. At present it will be used for lunches at noon for the day workers but after the holiday season it is expected to be operating 24 hours each day for the benefit of the shift workers. The cafeteria is completely air-conditioned and is lighted by concealed ligths in the ceiling. The ceiling is sound-proofed, and large windows offer a view of the Fox.

Mrs. Edward Howley, who was in charge of canteen work during the war in the Twin Cities, is manager of cafeteria.

Carter Rice Merges With Bulkley Dunton

Boston—The business merger of Carter, Rice and Company, Corporation, Boston, with Bulkley, Dunton and Company, Inc., New York, and Springfield, Mass., was made known this week. Hubert L. Carter, former principal owner, who has been associated with Carter, Rice and Company for 48 years, is retiring from the business and has transferred his entire interest in Carter, Rice to the consolidated companies.

Joining of the two companies' business interests is expected to result in considerably broadened service to the trade and increase the territorial coverage in New England. The statement emphasized the fact that there would be no change whatever in the business policies and principles with which this company has been identified for approximately three-quarters of a century.

Supplementing Carter, Rice's excellent distribution facilities in Boston, Worcester, and Providence with those of Bulkley, Dunton in Springfield and New Haven, the amalgamated companies will have by far the most extensive paper-merchandising organization in New England.

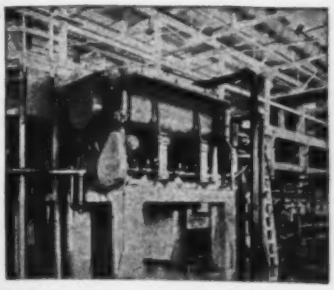
Founded 75 years ago in Boston, Carter, Rice has achieved the reputation of being one of the finest paper service houses in the country. In addition to its Boston headquarters and its two branches in Worcester, Mass., and Providence, R. I., Carter, Rice has resident sales representatives at Augusta, Maine; Montpelier, Vermont; Springfield, Mass.; Hartford, Conn.; and Syracuse, New York.

Nor is Bulkley, Dunton a newcomer to New England. In the middle of the last century the Bulkleys built a paper mill in Middlefield, Mass., and later purchased another one in the same locality. Edwin Bulkley, who was one of the founders of the 113-year-old organization, financed and encouraged the building of other paper mills, notably the Montague Paper Company and Keith Paper Company at Turner Falls, Mass., and the Winnipisauker Paper Company at Franklin, N. H. In more recent years, Bulkley, Dunton has maintained branch offices in Springfield, Mass., and New Haven, Conn. Also the distributor of the products of several leading New England mills, the company's history is closely associated with that of the paper industry in New England.

The new board of directors of Carter, Rice consists of C. A. Esty, J. O. Bulkley, W. H. Cowles, and J. C. Marvin. Officers are C. A. Esty, president; J. O. Bulkley, treasurer; D. A. McGreenery, assistant treasurer; J. C. Marvin, executive vice-president; John H. Brewer, vice-president; and W. H. Cowles, vice-president.

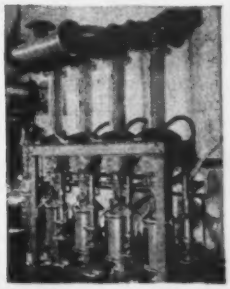
BIRD MACHINERY

This *Mill Equipment Number* of *Paper Trade Journal* is a good place to give you a quick picture of each and every item of Bird Machinery for the making of better pulp and paper and more of it per day at lower cost per ton.

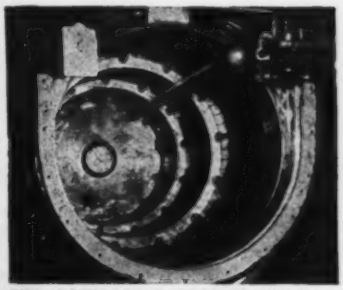


BIRD SCREENS—the standard of the world for high speed continuous production of uniformly good paper.

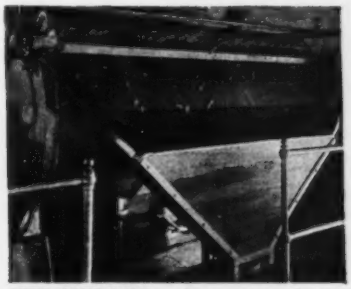
JONSSON SCREENS — for high capacity, high efficiency, low cost knotting and screening of pulps, brown stock, straw and fiberboard.



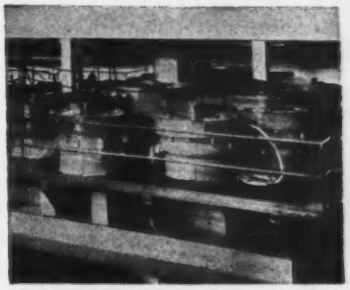
BIRD DIRTECS — for super effective, low cost removal of heavy, fine and light dirt by advanced application of the pressure drop principle.



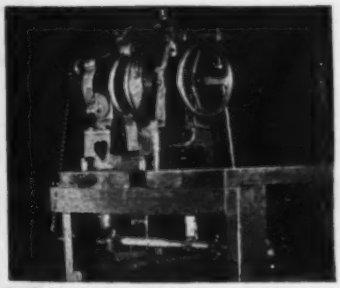
BIRD OSCILLATING SHOWER PIPES — for continuously efficient cleaning with minimum water.



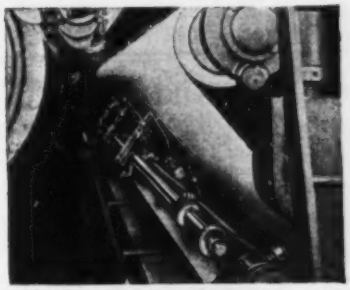
BIRD SAVE-ALLS — for recovery of stock from waste water at lowest net cost per pound.



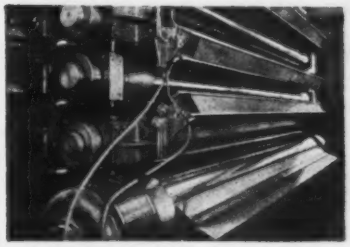
BIRD CENTRIFINERS—for triple centrifugal separation of hard-to-get dirt.



BIRD CONSISTENCY REGULATORS — for dependable maintenance of stock consistency at not more than 0.1% heavier or lighter than desired; range from less than 1% to 12% consistency.



VICKERY FELT CONDITIONERS — for keeping press felt continuously clean and absorbent without shut-downs.



VICKERY DOCTORS — for keeping all papermaking roll surfaces in shape to make better paper and more of it at lower cost.

Descriptive bulletins, cost estimates and installation data are yours for the asking

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Crown Zellerbach Net Rises 56 Per Cent

SAN FRANCISCO—Net profit of the Crown Zellerbach Corporation and subsidiaries for the six months to October 31 was $5,740,625, equal to $1.89 a common share, compared with $3,676,732, or $1.10 a share in the corresponding period of 1945. In its report, issued late last week, the company disclosed that this year's sales totaled $59,457,830, against $50,128,298 in the comparable 1945 period.

The company also reported that $5,700,000 was spent during the 1946 period for addition and improvement to plants, and added that during the next few years expenditures for such items will reach $40,000,000. While such expenses have been obtained from current funds, it was explained, the total funds to be expended will exceed those available from depreciation, depletion funds and earnings. Accordingly, the company has established a bank credit of $20,000,000.

Container Corp. Plant To be Ready by June

GREENSBORO, N. C.—According to announcement by H. L. Coble, contractor, exterior brick work has been started on the $250,000 folding box plant of the Container Corporation of America, on East Market Street extension.

Officials said the foundations are practically complete, and erection of structural steel will begin shortly. Completion of the structure, measuring 200 by 400 feet, is expected in mid-May or June. When in full operation, the plant will employ about 300 people.

It is understood that raw materials for the new plant will be obtained from mills operated by the same corporation, and from other mills in this and nearby sections. The plant will make folding cartons and corrugated shipping containers for industrial markets throughout the southeast.

Traffic League Elects Jones a Vice-President

Worcester, Mass.,—Elmer B. Jones, general traffic manager of Norton Company, and a transportation director of the Chamber of Commerce, has been elected New England regional vice-president of the National Industrial Traffic League.

The league is an organization of traffic managers of large industries and Chambers of Commerce. It has served during the war and reconversion periods in an advisory capacity to the Office of Defence Transportation.

Jones, formerly chairman of the Chamber of Commerce transportation directors, is a past president of New England Traffic Club and of the National Freight Golf Association, and Railroad and Steamboat Agents Association of Boston.

National Gypsum Pays 50 Cents

BUFFALO, N. Y. — Directors of National Gypsum Company declared a dividend of 50 cents a share on the common stock, payable December 20 to stock of record December 5. National Gypsum has paid common dividends only at the year-end since 1939. A dividend of 25 cents was paid on the common at this time last year.

Lebanon Mill Damage Slight

LEBANON, Ore.—Fire originating in a hot bearing on a paper making machine spread to the roof of the Crown-Zellerbach paper mill here and inflicted nominal damage to the attic and roof. Paper in the machine first became ignited but was controlled by the automatic sprinkling system. Lebanon firemen were called to quell attic and roof flames.

Scott Buys Cut-Rite Plant It Had Leased in Sandusky

SANDUSKY, Ohio—The Scott Paper Company, Chester, Pa., has purchased the land and buildings it now occupies from The Sandusky Foundry and Machine Company. Situated on approximately 2¼ acres of land are the manufacturing plant, a small warehouse, and several wax storage tanks.

Scott acquired the assets of the Automatic Paper Machinery Co., former operators of this plant, in the spring of 1945, and established at that time the Cut-Rite Division.

The Sandusky plant employs 70 people at the present time. Calvin T. Dussoulas, who moved to Sandusky in July of this year, is the local manager, and Harry Kentus, a Sandusky resident, is the production manager.

Russell M. Heath, general manager of the Cut-Rite Division, in a letter mailed to employes of the local plant, indicated that the company finds Sandusky an ideal location for the manufacture and distribution of Cut-Rite.

Envelope Makers To Meet

CHICAGO — Chicago became the envelope capital of America this week as the Envelope Manufacturers of America convened on December 2 and 3 at the Edgewater Beach Hotel. Business meetings were planned for all day on December 2 and on the forenoon of December 3 by R. R. Bliss, secretary of the Association.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending November 30, 1946

STOCKS

	High	Low	Last
A. P. W.	5⅜	5	5
Armstrong Cork Co.	48½	46	48½
Celotex Corp.	26¼	24½	25⅝
Celotex Corp., pf.	20¾	20½	20¾
Certain-Teed Products Corp.	18⅜	17	18
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	24¼	23¼	24¼
Champion Paper & Fibre Co., pf.	111	110	111
Congoleum Nairn Co.	25½	24¾	25½
Container Corp. of America	43½	42	43½
Continental-Diamond Fibre Co.	9⅜	8¾	9⅜
Crown-Zellerbach Co.	30⅛	27½	30⅛
Crown-Zellerbach Co., pf.	105¼	105	105
Dixie Cup Co.	30½	28½	30½
Dixie Cup Co.—A	54½	52	52
Flintkote Co.	31⅜	27¼	30½
Flintkote Co., pf.	108½	106½	107
Robert Gair	8⅝	8⅛	8⅛
Robert Gair, pf.	20¼	20	20¼
International Paper Co.	51½	45⅜	51
International Paper Co., pf.	105	104	105
Johns-Manville Corp.	126	123	126
Johns-Manville Corp., pf.	120	120	120
Kimberly-Clark Corp.	23¾	22	23⅛
Mac Andrews & Forbes	38	35½	38
Mac Andrews & Forbes, pf.	....	....	....
Masonite Corp.	53	50½	53
Mead Corp.	22	20½	22
Mead Corp., pf. 4¼	103	103	103
Mead Corp., pf. 2	48½	47	48½
National Container Corp.	31	28½	31
Paraffine Companies, Inc.	68	67¾	68
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	21¾	17½	21½
Rayonier, Inc., pf.	34¾	33¼	34¾
Ruberoid Co.	54¾	50	54¾
Scott Paper Co.	49	47	49
Scott Paper Co., pf.	102½	100⅛	100⅛
Sutherland Paper Co.	44	43	44
Union Bag & Paper Corp.	28⅛	26½	27¾
United Paperboard Co.	12¾	11½	12⅜
U. S. Gypsum Co.	113½	107	112
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	39	34½	38½
West Virginia Pulp & Paper Co., pf.	....	....	....

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 3¼s '60	101⅝	101⅜	101⅜
Certain-Teed Products Corp. 5½s '53	....	....	....
Champion Paper & Fibre Co. 3s '65	....	....	....
International Paper Co. 5s '47	....	....	....
Mead Corp. 3s '66	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending November 30, 1946

STOCKS

	High	Low	Last
Great Northern Paper Co.	41¼	40¼	41
Hummel-Ross Fibre Corp.	19⅝	18⅜	19⅛
St. Regis Paper Co.	9⅝	8⅞	9⅜
Taggart Corp.	7¼	6⅝	7¼

BONDS

American Writing Paper Co. 6s '61	....	....	....

WALWORTH

Pressure-Seal Valves

The greatest improvement in high-pressure, high-temperature valve design

LOOK AT THESE ADVANTAGES

1. BONNET TIGHTNESS
2. NO BONNET BOLTS OR WELDS
3. IMPROVED YOKE DESIGN
4. EASILY AND QUICKLY ASSEMBLED
5. EASILY AND QUICKLY DISASSEMBLED
6. DISC TIGHTNESS
7. IMPROVED GUIDE
8. STREAMLINE FLOW DESIGN
9. EASY TO CLOSE
10. EASY TO OPEN
11. VALVE STRONGER
12. WEIGHT REDUCED
13. SPACE REDUCED

WHY?

Because the fundamental principle of the design of the Walworth Pressure-Seal Valve is such that the internal pressure makes the body-to-bonnet joint tight. This tightness extends over the range of all practical conditions, including "carry-over", sudden changes of temperature, and sudden changes of pressure.

The body-to-bonnet joint is easily disassembled and assembled in a minimum of time, reducing the period the pipe line is out of service.

Valve maintenance is reduced to a minimum.

These valves have a semi-flexible disc which compensates for changes in the body shape due to temperature and pressure variations.

An improved guide extends over the entire travel of the disc, making the Walworth Pressure-Seal Valve easier to open and close.

Valve ports and guides are designed to give streamline flow.

The strength of Walworth Pressure-Seal Valves is greater than that of previous designs, even though the weight is reduced approximately 50 per cent.

Walworth Pressure-Seal Valves are now available in the following sizes: Series 900 — 3" and larger; Series 1500 — 1" and larger.

WALWORTH

valves and fittings

60 EAST 42nd ST., NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Boston Paper Trade Holds Annual Dinner

BOSTON—With Hon. Leverett Saltonstall as speaker, describing his experiences as a witness of the atomic bomb explosions at Bikini, and an attendance of 216, a record, the largest previous attendance was 185—the Fall Meeting and Dinner of the Boston Paper Trade Association in the Roof Ball Room of the Parker House November 26, was a signal success.

Sennator Saltonstall, who was a member of the President's Evaluation Committee to go to Bikini, gave a graphic and rapid-fire talk on the atomic bomb explosions. He saw the first explosion from the air through black glasses in a C54 about 9,000 feet up and 23 miles away. Sixty-eight planes were in the air that day. A ton of TNT, multiplied 20,000 times was the force of the atomic bomb, but "we want to call it atomic energy," said the speaker, "and not the atomic bomb."

Intimating its destructive effects, he said "radio-activity is the most scary part of the whole experiment."

Noting the 220 and more ships in the fleet near Bikini, he said it gave him a pride in the United States.

To show the explosions as force was mere folly. The purpose was to get results for scientists. The experiments were scientifically and efficiently contrived. A layman could bring back a desire to work for the peace of the world. We don't want children of our children in another war. "That is the lesson we learned from those atomic bombs."

During the dinner, the first twelve pictures of the explosions, taken from a platform on Bikini Island, were passed among the members and guests.

In a brief business meeting, with President James R. Carter II in the chair, Edwin Hansen, of Cook-Vivian Company, Boston, and Douglas W. Ronaldson, Worthy Paper Company Association, West Springfield, were elected to regular membership, and Philip L. Hovey, Oxford Paper Company, New York City, to limited membership. With a suspension of the rules, the following, whose applications were not received in time to be printed on the announcement of the meeting, were elected also: Regular membership, W. Elliott Pratt, Jr., Hollingsworth & Whitney Company, Boston; Philip H. Anderson, Dee & Anderson, Boston. Limited membership, E. Lee Turley, Mc Laurin-Jones Company, Brookfield, Mass., and Ware, Mass.; J. Gilbert Swift, Jr., Lily-Tulip Cup Corporation, Boston; Frank Roche, Lily-Tulip Corporation, Boston; William N. Allin, Southern Bag & Paper Company, Inc., Boston.

Arabol Readies a Watch For Grant's Christmas

NEW YORK — His twenty-fifth year of service with the Arabol Manufacturing Company is rapidly passing into history for Raymond L. Grant, assistant treasurer of the company. His friends are polishing up their best congratulations, and the company has ordered a handsome gold watch to be suitably engraved—all to be presented to him on the occasion of his induction into the Arabol 25-Year Club at the annual staff Christmas party.

Tinker Shows There Is More Paper

(Continued from page 37)

business organizations with consideration of economy in the use of funds would prescribe such action.

"No doubt the underlying basic reason for this meeting is the immediate difficulty on the part of the Government to obtain the grades of paper and the quantities that it needs. In relation to this factor, I should like to present to you the production record of the paper industry over the last few years. Most of the major industries in the United States would view this record with envy and, in fact, the paper industry has viewed it with pride. In the year 1939, there was produced in the United States 13½ million tons of paper and paperboard. In the year 1946, on the basis of production to date, and estimates for the balance of the year there will be produced 19,200,000 tons of paper and paperboard. With imports this will make available for domestic consumption, 22,415,000 tons, an increase of 41 percent over 1939. Taking the item of so-called printing papers alone, the annual rate of production based on the third quarter of 1945 was 2,000,000 tons. In the fourth quarter, the rate was 2.3 million tons; in the first quarter of 1946, 2.5 million tons and in the second and third quarters 2.7 million tons. The rate indicated for the fourth quarter is 3 million tons.

"Had the paper industry been unable to overcome the difficulties that plagued it, the existing tight supply situation would have been aggravated many fold. Since the first of the year the industry has been operating at 100 percent of rated capacity and in fact, during the last preceding month, operated over 100 percent of capacity.

"In view of this production record, why then is the Government faced with supply problems? I might suggest that there is an element of poetic justice in the picture because of the great difficulties that were met by the industry in convincing government agencies that paper was essential to the national economy when the national defense program was initiated. I myself made repeated attempts to this end but only after some real shortages that affected the war economy took place was the essentiality of paper really recognized.

"The paper industry has been operating, as have other industries, under various forms of control, including price control. It is an industry highly competitive within itself. Immediately after V-J Day, executives in the paper industry did just what you or I would have done. They attempted to reestablish old customer relationships and, looking to the future, sought new friends who promised to become permanent future customers. Government business has in the past been handled by some mills and not by others making somewhat the same lines. Some mills have studied the details of handling government orders and know how to meet the special requirements of government specifications. Others are not as familiar with them. OPA price ceilings have occasionally been deterrents in the past. Those companies who had not availed themselves of government business in the past were in a tight market situation, reluctant to destroy customer relationships in order to absorb government business, which they had not heretofore taken advantage of. Other companies, presumably because of grade shifting that had been forced upon them, if they were to maintain their economic lives, found it difficult or impossible to meet the Government's specifications. Many companies without doubt assumed that Government requirements for paper would overnight fall to a pre-war level, which I doubt will ever be the case.

"All of these factors contributed to the difficulties surrounding government procuring agencies. They are an aftermath of the war and the war economy and particularly of government controls established during the war.

"I wish that you and I might assume that the record highs in business activities would be maintained over the next few years. Frankly, it is my personal opinion that this is too much to expect. If it is too much to expect then, if the pulp and paper industry continues to operate at capacity, the difficulties in government procurement in the paper field should be shortlived.

"You and I know that if it could be done legally, it would be a simple matter for the industry to allocate government requirements among the producing mills and I think if this were done equitably no difficulty would be met. The Government's requirements must be met and we understand that steps to this end have already been taken.

"As to the future, plans for installation of new paper machine capacity, leave no room for doubt that our domestic requirements will be fully met. In pre-war years the excess capacity in the paper industry varied from 18 to 35 percent and the basis of planned new capacity, even considering the increased population and new uses, as well as additional governmental requirements, I think there is every reason to assume beyond reasonable doubt that highly competitive conditions will exist between manufacturers of paper, which means that the Government's business will be sought, and paper will continue to be a very cheap commodity. Conservation in any form is desirable, but on the basis of the outlook it is not a necessity in as far as paper is concerned."

IT'S NOT A TRICK—*but Training*

There's no trick to the way we solve *particularly tough* rubber roll problems.

The making of rubber rolls is our *special* business, and many of our men have done nothing else but make rubber rolls for a quarter-century or more.

So, when you have a rubber roll problem that appears to dodge a solution, put it up to us. In all likelihood our technical men will come through with the right answer. Stowe-Woodward, Inc., Newton Upper Falls 64, Massachusetts. New York Office, Woolworth Building, New York 7. Stowe-Woodward Rolls are made on the West Coast by Huntington Rubber Mills, Inc., Seattle 4, Washington.

STOWE-WOODWARD

CONSTANT LEADERSHIP

RUBBER COVERED ROLLS

George W. Mead Feted By Stevens Point

STEVENS POINT, Wis. — One hundred eighty persons, representing the Chamber of Commerce, the Rotary, Kiwanis, Exchange and Lions clubs, the Catholic Women's club, the Stevens Point Woman's club, the Stevens Point Business and Professional Women's club, as well as city officials and private citizens, honored George W. Mead, Wisconsin Rapids president of the Consolidated Water Power and Paper Company, at a dinner Monday noon, November 25, at Hotel Whiting.

Mr. Mead, who was the principal speaker, presented a deed to land along the Wisconsin river in Stevens Point to Mayor Ben W. Dagneau. The gift came as a surprise, since no advance announcement had been made. The only condition attached is that the land be used for public park purposes. It follows one made recently by Mr. Mead of a 40-acre tract on Lake Du Bay to Portage county, in which Stevens Point is located.

Included in the proposed park are such improvements as a picnic grove, court and flower garden, shelter, girls' playground, ball field with provision for skating and hockey rinks, volleyball, an auto parking area and trees. The city already has about $2,000 available for the purpose, and an additional sum is expected to be included in the 1947 budget, so that a substantial start can be made next year.

Several of the speakers stressed the harmonious relations between Stevens Point and Wisconsin Rapids, and the influence this solidarity has had in central Wisconsin. Mr. Mead, served three terms as mayor of Wisconsin Rapids.

R. T. Reinholdt, the toastmaster, referred to Mr. Mead as "one of the outstanding men in the state and in the paper industry" and told of the part he and his company have played in the development of this community. He related that Mr. Mead was responsible for the river front beautification in his home city. He also attributed to Mr. Mead's foresight the harnessing of the Wisconsin and the development of industry.

Mr. Mead spoke of his experiences since his first came to Wisconsin in 1891. He first opposed the building of a dam, but soon changed his mind and became a booster for power development. He became the builder of a dam and mill at Grand Rapids, as Wisconsin Rapids was then known, and the Biron development followed in 1912. That at Stevens Point occurred in 1916-17.

With these developments, along with the one at Du Bay and the acquisition of the Wisconsin River mill property south of Stevens Point, the river is now working five times for Consolidated at these five dams, he pointed out.

Mr. Mead also referred briefly to the reservoir system developed by the Wisconsin Valley Improvement Company, Wausau, including the Big Eau Pleine undertaking and the pending Little Eau Pleine project which, he declared, will mean better stream regulation. He explained the river beautification program at Wisconsin Rapids and said that there was an opportunity for similar improvement here.

Mayor Dagneau, accepting the deed in behalf of the citizens of Stevens Point, declared the gift will be an incentive for the park commission to carry out the improvement program.

Fred J. Schmeeckle, chairman of the Portage County Board of Supervisors, spoke of the recent gift by Mr. Mead of the tract on Lake Du Bay, and said that the county board had given financial support for the development.

Eastern's Guest House Proves Busy Mecca

CHICAGO—Paper distributors selling the products of the Eastern Company have been making frequent pilgrimages to the new lodge type guest house at Bangor, Maine, which most adequately and pleasantly houses all guests while they are at the mill to study the making of the Atlantic line from the bottom to the top. M. E. McGarry, Eastern sales executive at the Conway Building is now in Bangor, has already participated in the entertainment of Des Moines, Wisconsin, and Detroit sales executives and is looking forward to assisting in the entertainment of the Chicago contingent of Eastern representatives as they make their mill educational trip sometime in the Spring. The guest house, completed during the summer, has been a most busy place and a welcome accommodation for scores of paper trade folks from all parts of the country.

Sees Wisconsin Likely To Impose Restrictions

MADISON, Wis. — The Wisconsin Legislature at its next session will be asked to invoke legal restraints on the cutting of the state's immature timber, F. G. Wilson, superintendent of cooperative forestry for the Wisconsin Conservation Department, indicated last week. He said that sentiment at four meetings the previous week favored passage of such legislation. A final two-day meeting in Milwaukee December 9 and 10 has been scheduled by the Commission, to hear further testimony favoring or opposing the legislation.

"Expressions at the meetings at Wisconsin Rapids, Hayward, Rhinelander and Green Bay were generally in favor of the proposal, Mr. Wilson said. "There was some opposition to the plan but on the whole it was apparent that most forest land owners, cutting operators and representatives of wood-using industries want the legal restraints to safeguard future timber operations.

Transport Threat Concerns Indiana

INDIANAPOLIS, Ind., Dec. 2, 1946—While the coal situation is of the utmost importance to the paper manufacturing industry in the state this week, jobbers worried about the rail situation, particularly since local stocks are low and replacements seem to be getting more and more difficult. Most of the paper mills in the state depend almost entirely on coal to generate power, though some are using electricity and gas for power and other purposes.

Demand for all lines of paper continued active during the last week but some leaders in the trade say that if the holiday season were not almost here demand in some items likely would be dropping off because of conditions due to the coal strike. Wrapping paper and bags are badly needed here and will be short for some time according to present indications. Tissues of all kinds continued short here with lines forming before stores when tissues are advertised. Some of the smaller stores are dealing tissues out to regular customers from under the counter.

Building paper and roofing demand fell off some during the past week and unless other building materials become more abundant soon, practically all building will be stopped. However, the trade is expecting some better conditions next year.

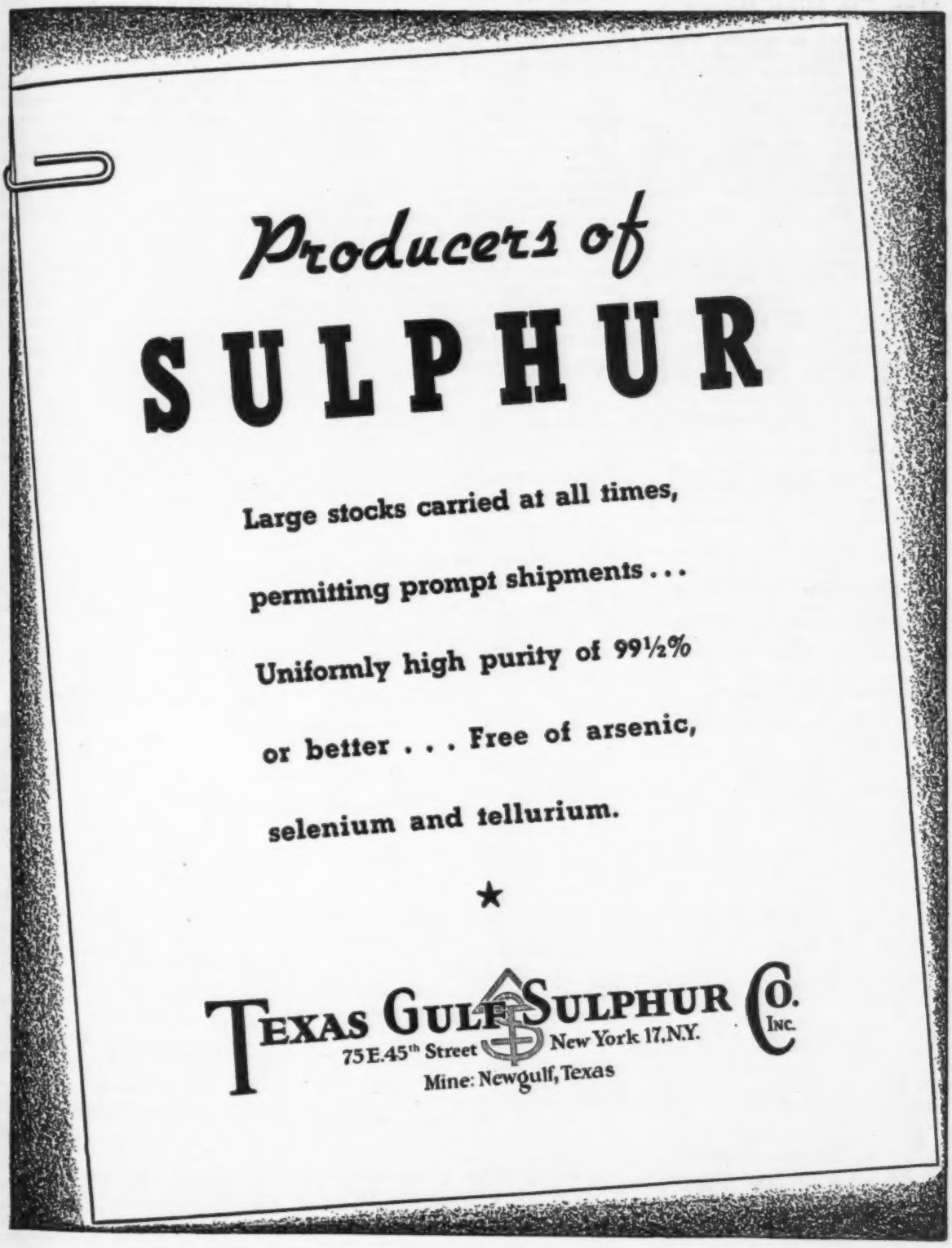
Newsprint demand also continued good in spite of increasing prices and many publishers are figuring on increasing advertising rates. Fine paper demand also was good and supplies, as in other lines, are short.

There appeared to be a fair supply of waxed paper here, but the demand continued heavy and stocks are dwindling.

Demand for waste paper was good last week and collections were only fair. Stocks in local warehouses are low and prices are increasing slowly. Rags were also in good demand with the better grades moving better than roofing rags and other items. Prices also in these lines were strong.

Reichhold Acquires Land For Further Expansion

PHILADELPHIA — Reichhold Chemicals, Inc., has just purchased 680 acres at Tuscaloosa, Ala., 21 acres at Elizabeth, N. J., and 5 acres at South San Francisco, Calif., in all of which cities Reichhold plants are now operating in addition to 110 acres which have also been acquired at Philadelphia, Pa. According to Henry Reichhold, Board Chairman, this acreage will afford sites for additional plants devoted to the production of synthetic resins, chemical colors and phenolic plastics, as well as new RCI chemical developments, details in regard to which are not yet available for publication.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Lynch Warns Package Men On High Prices

CHICAGO — Last week's Packaging Institute meeting here provided a program which for optimism and warning signals combined, has surpassed any meeting of its kind, according to those in attendance. Convening at the Stevens Hotel, the Institute heard W. D. Lynch, vice-president of the National Folding Box Company and retiring president of the Institute, warn that prices of packaging had increased more than 20 percent since OPA ceilings were lifted and that while this raise was understandable in "compensating for higher wages and materials costs" there must be care lest further advances might develop buyer resistance. Mr. Lynch indicated that higher wage costs generally could have this effect in the very near future. Mr. Lynch likewise pointed out that packaging manufacturers are being plagued by shortages of materials and of both skilled and unskilled labor and stated that he knew of no company with a surplus of basic materials including paper, plastics and wood. He saw no relief from these shortages until the latter part of 1947.

Mason T. Rogers, Dewey & Almy Chemical Company, was elected president of the Packaging Institute to succeed Mr. Lynch. Elected as directors were E. G. Kuhn, president, Consolidated Packaging Machinery Corporation; Karl E. Prindle, vice-president, the Dobeckmun Co.; Carl Schaeffer, sales manager, Stokes & Smith; G. W. Reese, American Can Company; A. F. Stevenson, Borden Company; and O. O. Scheller, Loose-Wiles Biscuit Company.

Meanwhile, those in attendance were getting a lot of new ideas about new packaging methods. Several innovations in packaging were on display, including one procedure whereby 40 cigarettes were contained in a pocket sized package and a tray for packaging crackers and baked goods.

One of the speakers, D. D. Uong, vice-president of the Fitchburg Paper Company and head of the Fitchburg Overseas Corporation, told his audience that a recent tour of the Far East markets had revealed great quantities of raw materials and finished articles which could be brought to the American market economically and safely through the use of modern, scientific packaging. Improve the packaging, said Mr. Uong, and a flow of oriental products would immediate result.

Another speaker, M. M. Zimmerman, editor and publisher of Super Market Merchandising, predicted to the Institute that "an unprecedented era of demand on the packaging industry was soon to come." He added that the country was entering an era of 100 percent self-service, which meant some form of attractive packaging for almost everything.

Prepackaging is well on its way to revolutionizing the merchandising of produce items in the food industry, according to Sydney K. Bradley, director of chain store sales of the Union Bag & Paper Corporation who spoke on the second day of the Packaging Institute convention at the Stevens.

Mr. Bradley predicted that the day will soon come when consumers will buy fresh fruits and vegetables as casually and as conveniently as they now buy canned goods and general packaged groceres. He backed up his statement by a survey made by his company which showed that "there seems to be no escaping the general conclusion that the public wants to buy and store managers want to sell fresh produce pre-packaged. He added that it was likely that packaged products eventually will be sold to retailers at the same cost as bulk produce and declared that packaging costs will be more than offset by savings in produce waste and store efficiency.

Nelson Allen, cellophane division of E. I. duPont de Nemours & Company, told his audience that potential requirements of materials from the packaging industry for fresh produce are "tremendous" and added that the demand for transparent films and other packaging materials exceeds supply.

Electric City Mills Buys in North Tonawanda

NIAGARA FALLS, N. Y. — Electric City Paper Mills, Inc., has purchased the property of the Simon Oil Company in North Tonawanda and will locate a factory there in the near future.

H. J. Lavner, Electric City vice-president, said there are three reasons for moving the Niagara Falls plant to North Tonawanda. First is that the Niagara Falls plant is located on leased property and there is not enough room for expansion. He also said the tax rate at North Tonawanda is lower than at Niagara Falls and that the North Tonawanda site offers better accommodations for the company's expansion program and for the receipt of raw materials. The company has 37 employes and produces 30 tons of paper daily. The plant is expected to employ 100 persons ultimately, he said.

Milton's Anniversary Booklet Describes 1916 Paper Trade

New York in commenoration of its thirtieth anniversary on November 20, the Milton Paper company, has issued a colorful, spritely illustrated twelve-page brochure. The booklet describes the growth of the company, the status of the industry back in 1916 (which was not unlike the present from the the viewpoint of paper supply), and depicts domestic and international conditions of that era. Tribute is paid to "Mike" Milton, founder of the company, and to the employes, mills and printing customers who aided in the development of this leading paper merchant.

Brown-Out Adds to Midwest's Troubles

CHICAGO — The local paper trade staggered through a week of "brown-outs" and of a one-day holiday with no apparent retarding of the tremendous demand which has characterized this market for a long time. The brown-out, growing in the severity of its effect, has already seriously crippled manufacturers of paper and allied products and the over-all effects on the economy are giving the entire paper trade serious concern.

As far as prices are concerned, there have been no weaknesses in the prices of any of the grades, despite the jump which came when controls were terminated. However, these prices, ranging from $10 to $25 a ton covering all grades, were reported by jobbers to be having little effect on buying. One jobber said that the mills could send him all the paper they could "get their hands on" and "he would sell it regardless of price." This condition is prevalent throughout this area as the mid-west plans for its biggest holiday trade and expects only a mild recession late in 1947 as a barrier to its path to an all-out boom.

Waste papers still represented an uncertain factor, according to local reports which indicated that published price bases were still extremely hard to get.

Badger Globe Turns In A Year Without Accident

NEENAH, Wis. — Employes in the manufacturing department of Kimberly-Clark Corporation's Badger-Globe mill have established a new safety record by completing a year of operation without a lost-time accident, the mill safety committee announced last week. The record represents about 380,000 man-hours of operation.

The committee also reported that members of the engineering and materials department have operated without a lost-time accident for seven months, while converting personnel has maintained such a record for five months, the last lost-time accident having occured June 15. The goal established by the mill safety committee, as of July 1, is for each department to reach 500 days without a lost-time accident.

Smith Employees X-rayed

LEE, Mass.—Six hundred employes of Smith Paper Inc. were X-rayed this week by the mobile X-ray unit which visited the mills. The service is made possible through the Berkshire County Tuberculosis Association and the State Department of Health, in cooperation with Smith Paper Inc. The examinations were made at no expense to the employes. The unit will return in the near future for retakes and absentees.

UP AND COMING *Strong!*

The post war period finds HOLYOKE modernizing and stepping up its program in tempo with the new era.

This giant super calender—14 rolls and with a 148 inch webb typifies Holyoke's ability to design and manufacture on a scale to meet all requirements.

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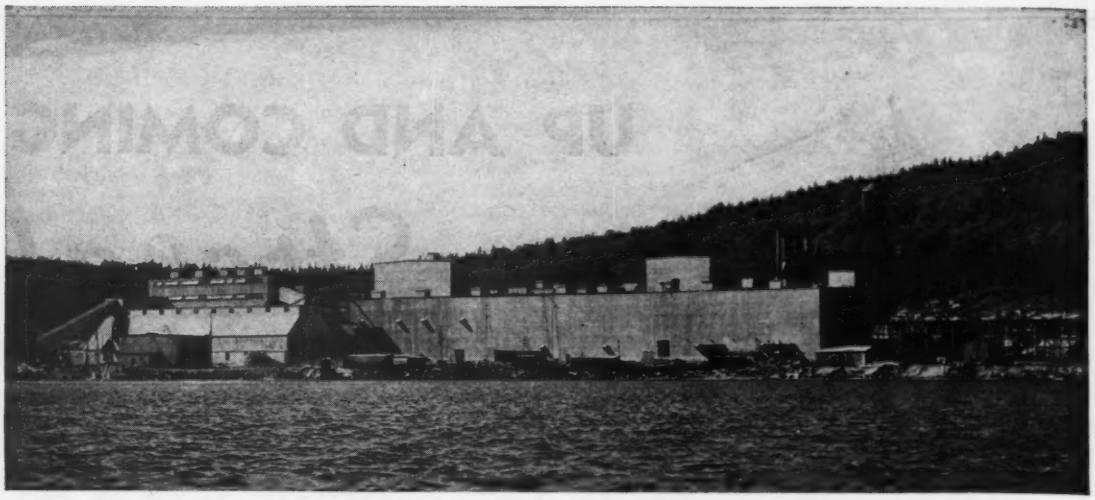
Machinery for Wood Pulp and Paper Mills. Cotton and Paper Calender Rolls.

Since 1863 the name Holyoke has held high rank in the paper manufacturing industry. Over 80 years of practical "know-how" is yours when you specify "Holyoke" Machine! See "Holyoke" first!

HOLYOKE MACHINE COMPANY

HOLYOKE, MASS.



Marathon's new pulp mill is all under one roof

New Marathon Sulphate Mill Soon To Begin Operations

Marathon Paper Mills of Canada, Ltd., will soon have its new sulphate pulp mill in operation on mill property which extends 4,500 feet along the north shore of Lake Superior in the town of Marathon, Ontario. The nearly completed plant, which has been under construction since the summer of 1944, is expected to be among the lowest cost producers in North America. Under the able direction of Niles Anderson, vice-president and woodlands manager, the plant is shaping up as a model of efficiency and will produce 600,000 pounds of bleached sulphate pulp every 24 hours. The entire mill, except for wood preparation, is housed under one roof. This streamlining will not only save employees time moving from department to department, but will also shorten pipe and power lines.

This bright new industrial community on the east end of Pennisula harbor has over 100 buildings, including Hotel Everest which has 30 large and comfortably furnished bedrooms, baths, dining room, cafeteria, barber shop, beauty parlor and tavern. The picturesque town of Marathon is now dotted with private dwellings with all the latest modern conveniences. A community hall, hotel, hospital, school, churches, laundry, bank, post office and department store make this a very livable residential district. The town is served by the main line of the Canadian Pacific Railway and boasts of a 425 foot wharf extending out into Lake Superior.

The mill building itself is 660 feet long and 188 feet wide, and has as its main feature a room running the entire length of the building which houses all the machines. The general contractor, Foundation Company, is represented by Frank Mullins, superintendent, and Harry Serson, engineer, with their own staff and crews. Stone and Webster, consulting engineers, were represented by R. A. McGrew and T. T. Jones. The bulk of Marathon's wood supply comes from the Pic River watershed area. Floated down the river, the wood is towed in booms of about 8,000 cords to the booming grounds in Peninsular harbor.

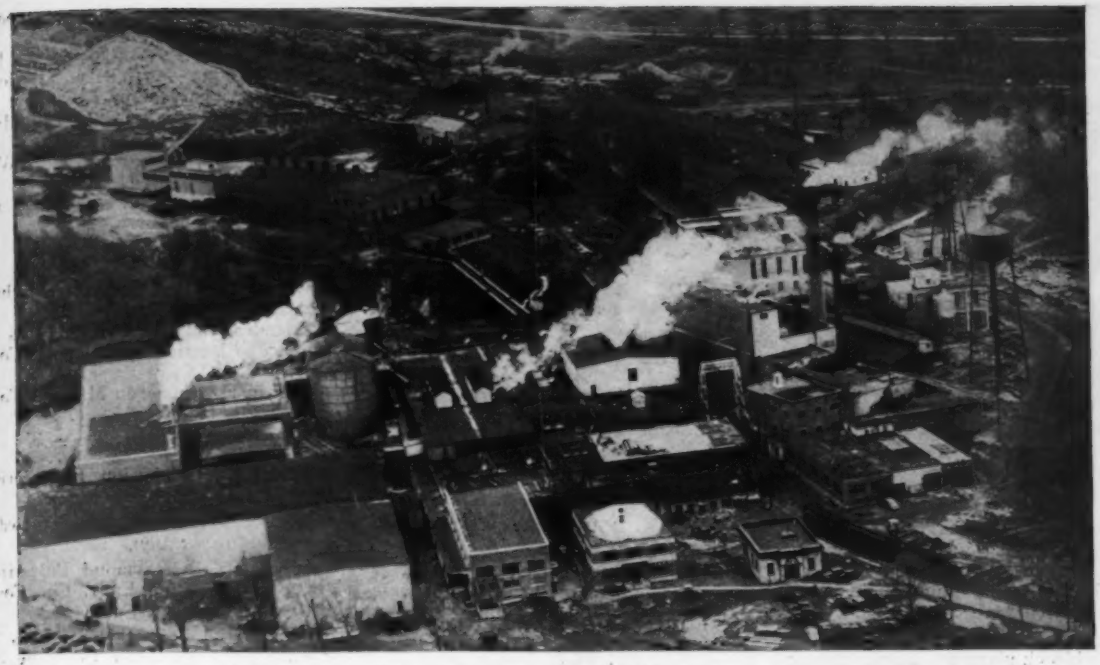
Marathon timber holdings consist of spruce, jack pine and hardwoods, and is said to be among the best wood in the world for the manufacture of high grade chemical pulp. Wood handling facilities are capable of handling 90 cords of wood per hour. A Jackladder which accommodates wood in 4, 8 and 16 foot lengths, has an 8 chain haul that carries 16 foot logs all the way to the three-saw slasher, 8 foot logs are carried to the slasher saws by two outside chains, while the 4 foot logs are taken on a block conveyor all the way to the barking drums. There is no back hauling of wood.

Mill equipment includes 7 digesters of 3,260 cu. feet each, all of which are connected with a Sandberg valve so that only one blow line enters the blow tank. A Rosenbladt heat recovery system used for reclaiming a maximum of blow heat which will furnish hot water for pulp washing and be available to other parts of the mill. Four American barking drums 12 feet by 45 feet, include 3 dry barkers and one wet barker which is operated in the wood room. A Carthage chipper equipped with a high speed 10 knife unit which chips wood at a maximum of 50 cords an hour as it moves from the barking drums or block pile. Chip screens are of the vibrating type. Chip storage, with a capacity of 1,200 units or about a 2 days' supply ahead of the digesters, is of the modern saw-tooth design operated by 5 control feed conveyors. Concrete storage bins of the Brinkley type. Modern Kamyr machines and Flakt dryers. A 7500 kilowatt double automatic extraction Westinghouse turbine generator which produces 500 and 125 pound pressures for cooking processes and 30 pounds for the dryer. Processed water for the use of the mill is pumped from the lake through a 48 inch pipe extending 3,000 feet from shore. A 7 body sextuple effect Goslin-Birmingham evaporator. Two Tomlinson recovery units. A 245,000 pound Diesel electric locomotive is used for switching around the yard and for hauling to the main rail line. Canadian Allis-Chalmers pumps are used for all filtrates, and circulation pumps. The laboratory is equipped for testing and controlling quality and product, although its primary purpose is to furnish paper pulp to the plants of the Marathon Corp. of Rothschild, Wis.

His Kaukauna Friends Dine in Smith's Honor

KAUKAUNA, Wis. — L. J. (Lefty) Smith was honored Saturday evening, November 30, at a dinner and program at the Kaukauna Elks Club. He resigned recently as manager of the Combined Locks Paper Company to take a similar position at Kalamazoo, Mich., for the St. Regis Paper Company.

Al Michels of Radio Station WTAQ, Green Bay, an expert on sports, was toastmaster at "Lefty Smith Night." Al Kronforst was chairman. Mr. Smith is known throughout the state for his baseball activities. He played with and managed the Kaukauna baseball team when they were the best in the old Wisconsin State and Fox River Valley Leagues, and was the leading home-run king and hitter for many years.



The St. Regis mill at Deferiet, N. Y., is busier with its capacity enlarged. The new paper machine is housed in the building at left; the power house is the new building at right center, with the stack

St. Regis Boosts Its Output At Deferiet By 37½ Per Cent

With the inauguration of production on its newly completed Number 6 machine at its mill in Deferiet, N. Y., during October the St. Regis Paper Company became one of the first major companies to obtain results from the vast rebuilding and expansion project which the pulp and paper industry has launched since the end of the war. Only a part of the whole St. Regis plan for a broadly integrated manufacturing program this single unit has achieved the highly satisfactory result of increasing production at this mill by 37½ per cent. It is only a part of the work that has been laid out for Deferiet, for a trip of inspection also showed a highly perfected power plant and electricity distribution system nearly completed, a calender room under construction, a battery of Roberts grinders that is expected to add considerably to the mill when all seven shall be working, and general betterments throughout the plant.

Chief interest, from the end-product point of view, enters in the 218-inch Fourdrinier paper machine, eighty feet long, with a trimmed sheet capacity of 204 inches. It was built by Bagley & Sewall, in nearby Watertown and is set up over a tile lined couch pit. An Oliver 16-foot Save-All reclaims the couch stock. The machine is equipped with a Beloit suction couch, and Beloit first and second suction press and smoothing press. Four Nash vacuum pumps supply the vacuum. Controls are mounted in a panel at the wet end of the machine.

The sheet passes to a series of 34 five-foot drying rolls 212 inches across the face, set up under a Ross hood with three economizers. Two Bird Vickery doctors, Foxboro temperature control, Farrel-Birmingham calender, Bagley & Sewall reel and winder complete the machine. The room is equipped with a Whiting overhead 25-ton crane, and the reel and winder have Industrial Engineering cranes. The complete machine is designed for a capacity of 105 tons a day of 22-pound paper at a rate of 1,100 feet each minute.

When it is completed the new finishing room building will house five Appleton super-calenders. Two 152-inch and one 120-inch calenders are to be installed first, with two more to be added as soon as possible later.

A general view of the Deferiet mill, with a St. Regis official as a guide, indicates that the company's interest is of the expanding type. The pulp-wood storage yards back of the mill give first class clue to this when it is made known that the 50,000 cords storage capacity is filled with woods of various types from the company's own land, in New England or in Canada. In New York and New England St. Regis owns 350,000 acres, in Canada it has another 200,000 with an additional 100,000 acres under crown leases.

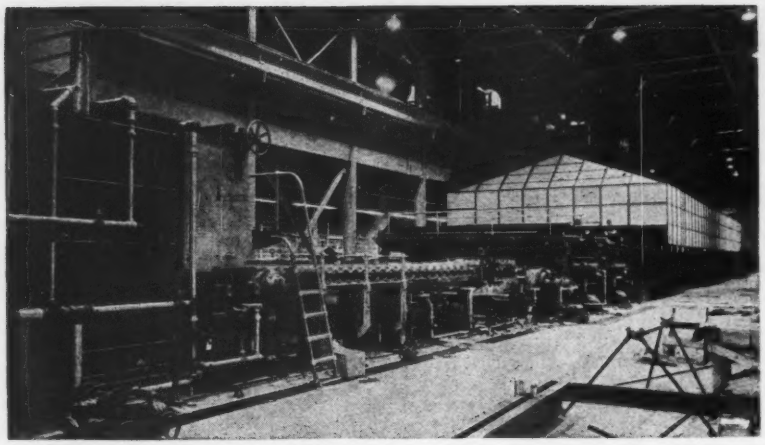
This stock pile feeds twin pulp mills, a bleached groundwood mill and a sulphite pulp. The groundwood mill turns out a peroxide bleached pulp of excellent characteristics for rotogravure, book, catalog and directory printing. Long fibered sulphite pulp adds strength to the sheet.

The course of the wood from its original forest to the Deferiet grinders is practically continuous. Whether the pulpwood comes by train, or by boat across Lake Ontario, every device is used to speed its handling. In the case of Canadian wood which comes in at a nearby town on the lake shore, the hook type of stacking is adopted, so that when the cars reach the mill stockpile it is necessary only to attach a crane cable to lift a cord of wood at a time from the car.

From the stockpile or from railroad cars, a grab-bucket loads the logs to general conveyors which bring the four-foot sticks direct to the washing drum of the ground wood mill. This drum has a capacity of 140 cords for each eight-hour shift.

With the bark removed, the logs are flowed through the sorting conveyor to a battery of five Roberts grinders. It is contemplated that this battery shall be increased to seven. Each grinder has a capacity of twenty-eight tons per day per stone. The slush stream passes through screens, rifflers of 22 deckers to a chest from which it is pumped to the beating room.

In the chipper room, a ten-knife Carthage chipper prepares wood at the rate of twenty-five cords an hour for the sulphite mill. A new chip bin and



No. 6 Machine—it has increased Deferiet's capacity by 37½ percent

conveying system have been built to service the 14 x 45, twelve-ton sulphite pulp digester. This digester has been installed in a building which already houses three 14 x 38 digesters. Daily digester capacity is set at 105 tons.

The bleach plant has a daily capacity of 55 tons for two stages of bleaching. The first bleaching stage uses chlorine and the second hypo-chloride.

In its new power plant and electricity distribution system, the Deferiet mill has increased its capacity materially. A new non-condensing Westinghouse turbine is now being installed to generate 6000 KW. It will operate on high-pressure steam at 800 pounds, and its exhaust, at 150 pounds pressure, will be used to drive the power machine. There are two new combustion engineering boiler units with a capacity of 120,000 pounds per hour of super-heated steam at 800 pounds pressure and 750 degrees temperature. Pulverized coal for these boilers is fed from a suspended bin, the boilers requiring 240 tons daily.

The engineering of the improvements at Deferiet was under supervision of Charles T. Main, Inc., of Boston. The George A. Fuller Company of New York was the general contractor.

A detailed list of the major equipment follows.

Equipment—Groundwood Mill

Washing Drum — Fiber Making Process, Inc.

Pulp Grinders (Roberts)—Appleton Machine Company.

Grinder Couplings—Bartlett & Hayward Div., Koppers Company.

Tailing Screen—Bird Machine Company.

Sulphite Mill

Digester—Chicago Bridge and Iron Company.

Digester Lining — Stebbins Engineering and Manufacturing Company.

Circulating System — Chemipulp Process, Inc.

Blowpits—Kalamazoo Tank and Silo Company.

Vacuum Pulp Washer — Improved Paper Machinery Corp.

Vibrating Knotter Screens — Bird Machine Company.

Flat Screens—The Sandy Hill Iron and Brass Works.

Equipment — No. 6 Paper Machine

Consistency Regulators — Poirier Control Company.

Jordans—E. D. Jones and Sons.

Screens -- Bird Machine Company.

Paper Machine—The Bagley & Sewall Company.

Vacuum Pumps—Nash Engineering Company.

Condensate Return System — Nash Engineering Company.

Machine Crane — Whiting Corporation.

Saveall—Oliver United Filters, Inc.

Roll Heading Machine and Scales—D. J. Murray Machine Company.

Suction Press Rolls — Beloit Iron Works.

Dandy Roll — Cheney Biglow Wire Works.

Turbine — Worthington Pump and Machinery Company.

Supercalenders

Supercalenders — Appleton Machine Company.

Calender and Rewinder Drives — Reliance Electric Engineering Company.

Rewinders—Cameron Machine Company.

Steam Plant

Boilers — Combusion Engineering Company.

Soot Blowers — Diamond Powder Specialty Corporation.

Pulverizers — Raymond Pulverizer Div. of Combustion Engr. Co., Combustion Engineering Company.

Induced and Forced Draft Fans — Green Fuel Economizer Company.

Dust Collectors—Western Precipitation Corporation.

Coal Scales—Richardson Scale Company.

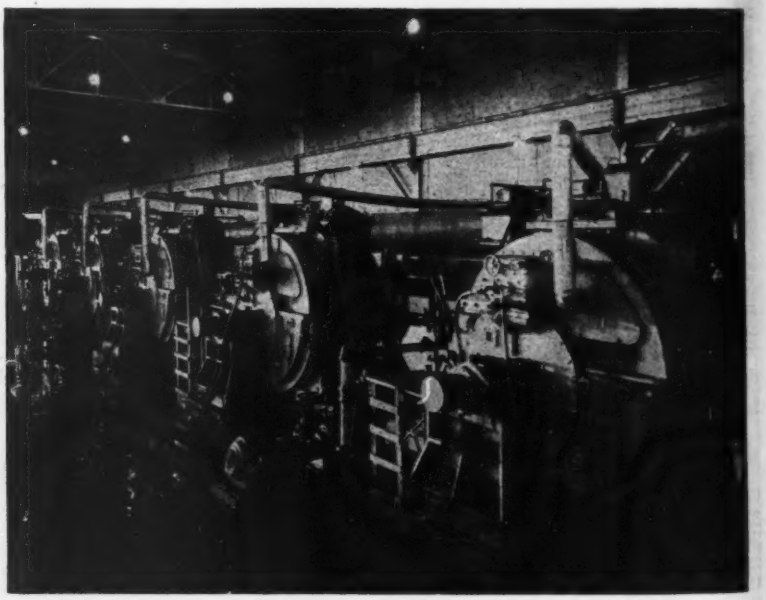
Ash Handling — United Conveyor Corporation.

Water Treatment—Infilco Incorporated.

Deaerating Heater—Cochrane Steam Specialty Company.

Feed Water Heater—Alco Products Company.

(Continued on page 64)



The Grinder Room with its battery of Roberts Grinders has had its capacity stepped up

Perhaps you know ROSS AIR SYSTEMS as individual units. Actually a combination of units is used to meet your individual mill requirements; to make one integral and complete AIR SYSTEM for your particular manufacturing process. J. O. ROSS ENGINEERING CORPORATION prides itself in being one organization that can properly take care of all your air needs. Each problem is carefully analyzed with the overall picture in mind.

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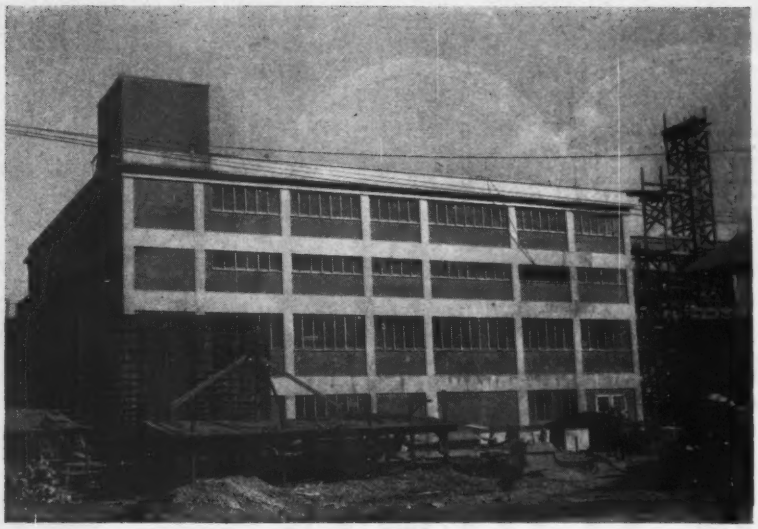


Addition to Champion's Canton Mill to house new 242-inch Fourdrinier Machine

Champion's Triple Program Aims at Better Production

The Champion Paper and Fibre Company is carrying out an extensive modernization and expansion program at the company's three mills, located at Hamilton, Ohio; Canton, North Carolina; and Houston, Texas, respectively. Improvements and additions to the manufacturing facilities are being installed to maintain the company's competitive position, to assure Champion customers of more and better products, and to provide continued opportunity for employment of 6,800 Champion employees at the three mills. This program also is expected to give added security to the investments of Champion stockholders.

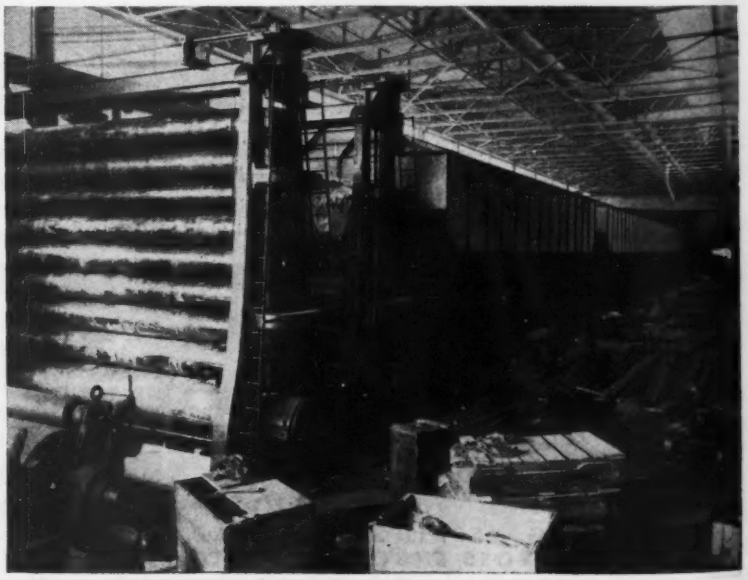
At Hamilton, Ohio, the original plant site of the company, expansion is taking place in the equipment to produce fine coated paper. New machines already are being put in operation and additional ones will go into production as they are ready. Just how soon these machines will be completely in operation is unknown at the present time.

At Canton, North Carolina, where Champion first began operating a pulp mill in 1908, a new large paper machine is being installed. This is a Fourdrinier type machine 242 inches wide and is a twin of the present machine now operating at that mill. These two Fourdrinier paper machines will be the largest of their type in the world making fine printing papers. The new machine will incorporate all of the latest improvements developed by the paper machine manufacturing industry and the Champion's own engineers. The new machine is being erected by the Pusey-Jones Company of Wilmington, Delaware. Champion also is adding a new boiler and turbine to its facilities at this mill, and is converting the sulphite pulp mill to a kraft mill. By converting a pulp dryer to a cylinder board machine, Champion will increase its production of stock for milk containers and frozen food packages.

At Houston, Texas, the newest of the three mills operated by Champion, a 250-ton recovery unit has been purchased to increase efficiency and step up production of the pulp mill. A new groundwood plant will provide pulp to improve the printing quality of paper Champion makes for publications. Bleach and water filter plants also are being added to enable the company to produce pulp of higher brightness, thus making for better quality in the printing papers made in Hamilton. Just recently a permit was issued by the C.P.A. for construction of added building facilities to house these various additions to the company's manufacturing facilities.

During the past year Champion has

Champion's Big Bertha, a 318-foot lime kiln at Canton, N. C.



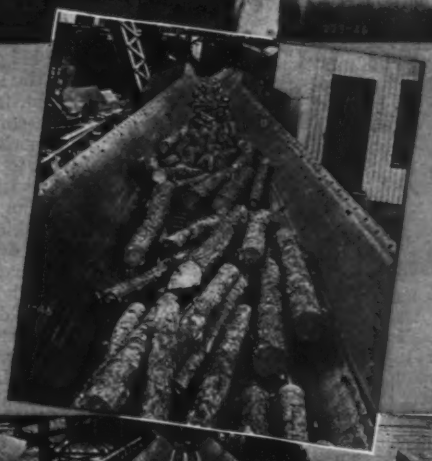
Erecting the new Paper Machine at Canton

Double Strand PULPWOOD CONVEYOR

Using Jeffrey PW 132 Chain

(PATENTED)

with S-212 Spurs



Note the ruggedness of the spurs, formed from ¾" steel plate, unbreakable and cannot become detached from the chain. These features combined with the extra-wearing qualities of the Jeffrey PW type chain permit a trough construction of the simplest and most economical design. Send for complete information.

JEFFREY EQUIPMENT INCLUDES:

Belt Conveyors	Log Haul-ups
Chip Conveyors	Re-Chippers
Crushers (salt cake)	Shredders
Elevators (bucket)	Unloaders (barge)
Feeders (lime, salt cake)	Transmission Machinery

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One of two machine stacks on the new 242-inch machine at Canton Mill

spent more than $5,000,000 for this postwar expansion program, and an additional large expenditure is anticipated to be made during the present year. There are other projects under consideration by officers and directors of the company which are expected to have beneficial effects on the company's future.

Champion, like every farsighted segment of American business, is basing its future on continued progress.

Keyes Fibre Company Plant To be Ready by Summer

The Midwest unit of the Keyes Fibre Company now under erection at Hammond, Indiana, is expected to be ready for operation late in the summer of 1947. This plant is located on a thirty-five acre tract of land recently acquired by the company on the east side of Indianapolis Boulevard between 165th and 167th Sts. in Hammond, Indiana.

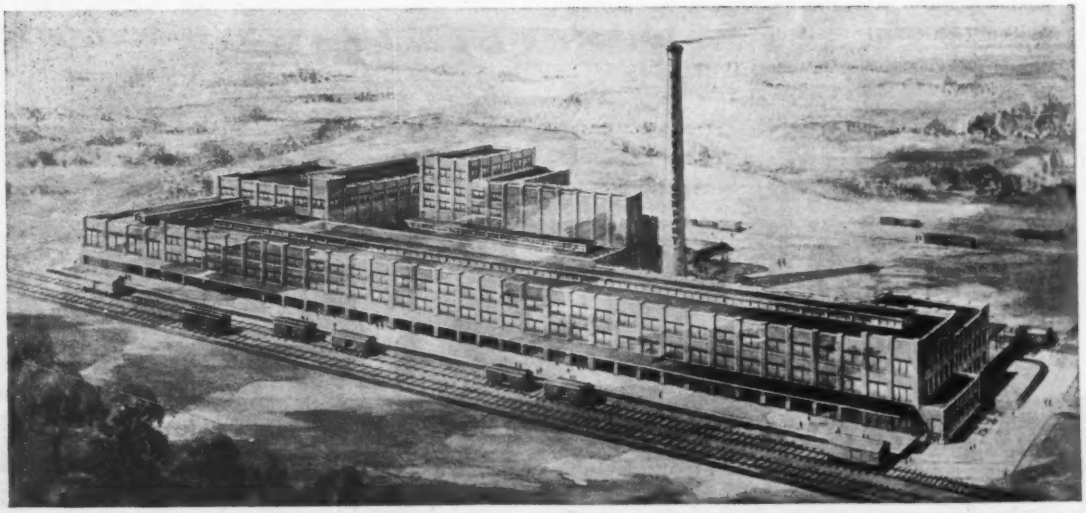
The building, which is the first unit of the middlewest project is 464 x 200 feet, approximately one-half of one story, the balance two stories, and a small area over the machines three stories in height. The office will be included in the same building and will be on the front, facing Indianapolis Boulevard. The construction is of concrete, steel and brick with steel sash and very extensive window areas. The plant will be served with tracks running into the building from the Indiana Harbor Belt Railway, which has service arrangements with over twenty ralroads running into that area. Ample facilities are provided for acceptance of merchandise and delivery via motor trucks. Complete waste and sewerage disposal, as well as water supply, is provided through the Hammond city facilities.

Conventional molding equipment together with dryers and pulp preparation machinery of the conventional type will be installed in this plant. Molded pulp plates, dishes and various articles now made at Waterville will be also made at Hammond. The manufacture of molded pulp egg flats, the consumption of which takes place largely in the middle western states, will be transferred to Hammond. At the present time none of the plastic operations of the company will be carried on in this plant. Incidentally, it might be stated that other tonnage in the molded pulp field will be taken on at Waterville so that the total tonnage manufactured in that location will not be affected by the additional production at Hammond.

Inasmuch as a very substantial percentage of the company's business is located in the middle western states, particularly that applied to the packing of eggs, this location was chosen, the freight advantages and the proximity to this large market being obvious reasons for the move. This location is also an advantageous one from the standpoint of procurement of raw material. Mechanical pulp for this unit will be shipped by water from Canada. Chemical pulp is available in reasonable quantities at points nearby, and the waste paper market in the Chicago area is attractive. It is expected that the expenditure on this unit will be somewhat over $1,500,000.

The engineering work in connection with this development is handled by the company's own engineering department, supplemented as far as architectural details are concerned by Bachman & Bertram of Hammond, Indiana. The general contractor is Fred C. Rowley & Sons, Hammond, Indiana. Equipment is being acquired from regular suppliers in the pulp and paper trade, and the molding machines are of the special patented construction developed and built by the company.

A NEW KRAFT BOARD MILL FOR GEORGIA

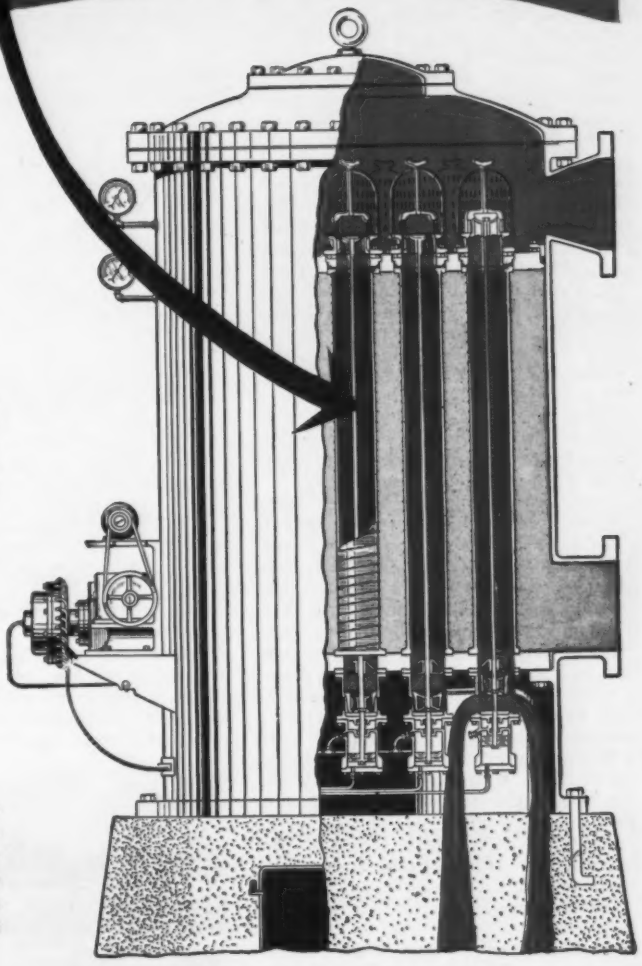


Perspective drawing of new kraft board mill now under construction at Macon, Georgia, for the Macon Kraft Corporation. The plant is being erected by James Stewart & Co., Inc. from plans by George F. Hardy, consulting engineer.

ADAMS AUTOMATIC WATER FILTERS

Performance-Proved

BY THE PAPER INDUSTRY



√ *for* PRIMARY FILTRATION

PORO-SCREEN Filters are a practical method for filtering water direct from the river or other source. Removes sand and grit 15 times finer than 1/32". Delivers a large volume of filtered water suitable for general mill service in the processing of newsprint, box board and other coarse grades of paper stock.

√ *for* SECONDARY FILTRATION

PORO-STONE Filters provide effective filtration for water required in high grade paper stock. Installed following sand filter equipment, the PORO-STONE Filter eliminates finest sand, pipe scale and all foreign matter which might impair paper quality.

ADAMS Filters (both PORO-SCREEN and PORO-STONE) are designed for continuous, automatic operation. No moving clearances to pass foreign material—no shut-downs required by back-wash cleaning—very little attention needed. *Constant filtration assured at all times.* Built in several sizes to meet your requirements. Write for Bulletin 901.

★ R. P. ADAMS COMPANY, INC. ★

77 CHICAGO STREET, BUFFALO, N. Y.

ADAMS **PORO-STONE AND PORO SCREEN** FILTERS

Paper Mill Expansion Projects Fill Rust Engineering Schedule

As specialists in design and construction of paper making plants, The Rust Engineering Company, Pittsburgh, Pa., is at present engaged in the most extensive engineering and construction program of its history to meet the expansion needs of the paper producing industry. The Company's work embraces the design and building of complete plants, modernization of existing facilities, building of expansions and new mills, and equipment erection. It is carrying on these activities in seven states.

Paper making companies for which engineering or construction services are being currently provided include Brown Company, West Virginia Pulp and Paper Company, Container Corporation of America, Celotex Corporation, Armstrong Cork Company, Crossett Paper Mills, Camp Manufacturing Company, Hollingsworth & Whitney Company, as well as others, where projects are not yet in the stage to be announced. Such major features of these projects as may be revealed at present are reviewed below in order to convey a partial picture of the extent and significance of the industry's expansion program.

For Brown Company, the largest employer in New Hampshire, a complete sulphate pulp and paper plant with an initial capacity of 200 tons per day is being erected according to Rust design at Berlin, N. H., adjacent to Brown Company's Burgess mill. In the company's Gorham, N. H., plant a new 196-inch paper machine and stock preparation equipment are being installed. The new machine, to be used for the production of towels, is equipped with a Yankee dryer, and is designed for a speed of 1,200 feet per minute. With the new machine using slush pulp, the two present machines, which have been producing towels, can be released for manufacture of the Company's other paper products.

The pulp mill in Berlin is being connected with the paper mill in Gorham three miles away by two 16-inch stock lines and one 22-inch water line. A new group of buildings is being erected in the yard of this former mill to house kraft digesters and to provide for installation of equipment and machinery for the liquor recovery cycle; and a black liquor recovery furnace with electric precipitation equipment will be erected. Eight high density stock storage tanks of 800 ton capacity of reinforced concrete, constructed by the sliding form method, are included in the program.

As part of the general expansion program, Rust designed and constructed a dam in the Androscoggin River, which was put in service last year.

At Fernandina, Fla., another new plant, comprising an extensive addition to the facilities of Container Corporation of America, has been designed and is in process of erection by Rust. Five brick, glass block and steel buildings, which will approximately double Container Corporation's floor space at this location, are being built.

The installations will house a Foudrinier paperboard machine trimming 160 inches, a diffiuser, and screen stock preparation and roll storages facilities. A power plant with 100,000 lbs. boiler, new 6,000 KW turbine, new black liquor recovery furnace, and evaporating equipment will also be erected. The plant site will be developed with new roadways, parking areas, railroads, sewer and fire protection system; and a new group of administrative buildings, consisting of office and personnel facilities of the most modern type will be constructed.

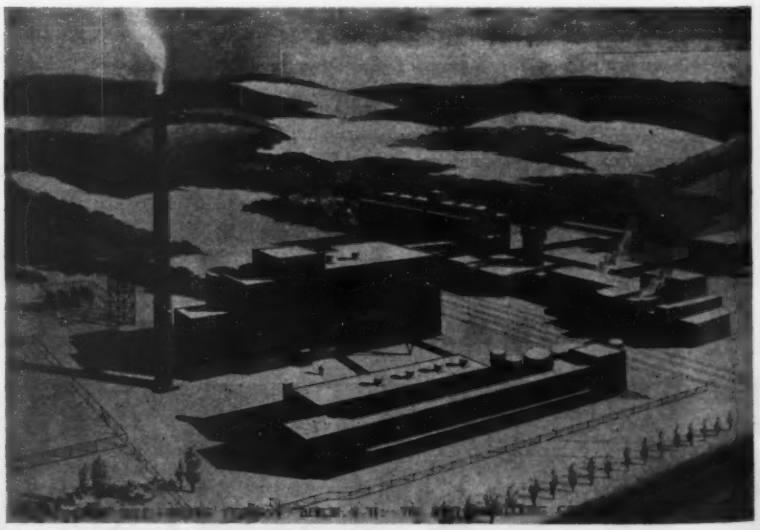
Work is now well under way and is scheduled for complettion in 1947. The new additions will enable Container Corporation to convert pulp, which it currently manufactures at Fernandina, into paperboard at the same site. As one of the largest users of paperboard, Container Corporation will continue to purchase substantial tonnages of Kraft board from other mills in addition to consuming its own production of that grade.

Another extensive moderization program is being carried out for West Virginia Pulp and Paper Company at its Covington, Va., plant. This work includes design and construction of a warehouse 6,000 square feet in area for activated carbon, together with elevators and a bridge from the present packing house and other handling equipment for delivery of the finished product from the manufacturing area. An evaporator plant is also being designed and built, comprising two sextuple effect evaporators with provision for a third. In the bleach room, six bleach tanks, a chlorine tank and an acid treat tank are being erected.

This program will be scheduled for early spring completion, while a new addition to the present water filtration plant is currently being completed and made ready for use.

Another mill being materially expanded is that of Celotex Corporation at Marrero, La., where additional pulping, refining and manufacturing equipment and the necessary buildings for the production of increased quantities of bagasse products are being provided. Facilities are also being erected for manufacture of specialty products such as asphalt materials, brick siding, insulating board, acoustical tile and related products. Work is well under way.

For Armstrong Cork Company at Macon, Ga., a modern insulating board mill has been designed, with a capacity of 300,000 square feet of board one half inch thick in 24 hours. Local timber of the region will be used in production. Construction on this plant is well along, and installation of machinery is expected to start shortly. Design work is also in progress for installation of modern bleaching facilities for Crossett Paper Mills at Crossett, Ark. The ultimate development of this auxiliary will provide full bleaching capacity for the entire output of these mills. Design details are being completed, and construction will be begun in 1947. Recent additions also have been made to wood handling and preparation for the Camp Manufacturing Company at Franklin, Va.; and the new cafeteria, plant office and other facilities have been completed at Hollingsworth & Whitney Company's Mobile, Ala., plant.



A new Pulp Mill for the Brown Company, at Berlin, N. H., a Rust Engineering Project

- Press and Felt Rolls
- Couch Rolls with sealed ends
- Rub-Roc Top Press Rolls
- Marblex Table Rolls
- Suction Press and Extractor Rolls

YOU GET 9 BENEFITS

1. Coverings adhere inseparably to metal shell.
2. FLEXLASTIC coverings will not oxidize or surface harden.
3. May be held in storage without deterioration or change of any kind.
4. Corrugating and checking virtually eliminated.
5. Uniform surface qualities and resiliency.
6. Resist abrasion and acidity.
7. Make felts last longer.
8. Increase production and overall quality.
9. Reduce manufacturing and maintenance costs.

Before your next roll recovering job, check with the Manhattan plants where many of the world's largest rolls are rubber covered.

Plants at Passaic, N. J. . . . Neenah, Wis. . . . North Charleston, S. C

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MANHATTAN PRODUCTS
FOR THE PAPER INDUSTRY

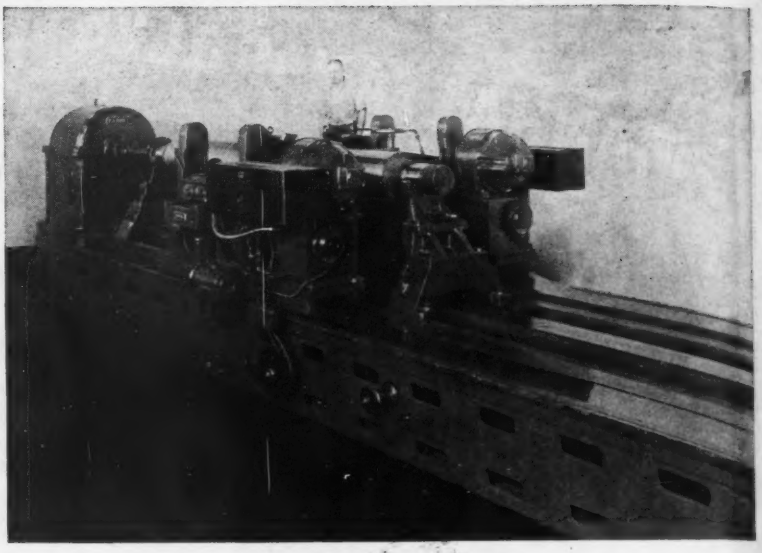
Compensated Belt	Engineered Rubber Goods
Endless Cord Belt	Oilless Bearings
Conveyor Belt	Gaskets and Packing
V-Belts	Asbestos Friction Material
Paper Machine Hose	Screen Diaphragms
Air Hose	Rubber Covered Rolls
Acid Hose	Printing Ink Rollers
Fire Hose	Rubber Lined Tanks
Steam Hose	Rubber Lined Pipe
Suction Hose	Abrasive Grinding Wheels
Water Hose	
Flexible Pipe	

RAYBESTOS-MANHATTAN, I

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES AND FACTORIES PASSAIC, NEW JER

Farrel-Birmingham Improves Two-Wheel Roll Grinder



A new design of paper mill roll grinder announced by Farrel-Birmingham Company, Inc., of Ansonia, Conn. provides faster grinding and finer finishes, with closer control of roll accuracy and crown shape.

The exclusive swing-rest principle, with the use of two grinding wheels of large diameter, is still the key feature, but new design elements plus experienced Farrel workmanship contribute importantly to the grinder's increased precision performance.

An important change is the elimination of the overhead wheel drive which does away with the supporting structure and the possibility of any vibration from that source, and also makes the mounting and dismounting of rolls a more simple manuever.

The grinding wheel spindles are of large diameter, which assures rigidity under working loads. The bearings are babbitt-lined steel sleeves, with adjustments for the control of running clearance. The new wheelhead design permits the exchange of wheels without disturbing either the spindles or the bearings.

The new design of carriage is driven by a large diameter nut engaging a traverse screw in the center of the bed. The adjustable variable voltage motor with electronic control provides stepless, wide-range speed regulation without any speed-change gears and clutches.

The headstock drive has also been redesigned and consists of a V-belt drive in the first reduction from the motor, followed by two geared reductions totally enclosed in an oiltight housing. The gears are of the continuous tooth herringbone design, precision-generated by the Farrel-Sykes method and especially noted for their smooth, quiet operation.

Modern electrical equipment has enhanced the operation of the grinder in that the headstock and wheel motors and controls are of direct current characteristics, providing 4 to 1 speed variations for the headstock drive and 2 to 1 on the grinding wheels. The carriage traverse speed variation of approximately 20 to 1 is accomplished by an electronically controlled drive unit taking its power from alternating current supply. The combination of these speed adjustments allows the operator to select the best speed for any type of finish required for the great variety of rolls used in the modern paper mill.

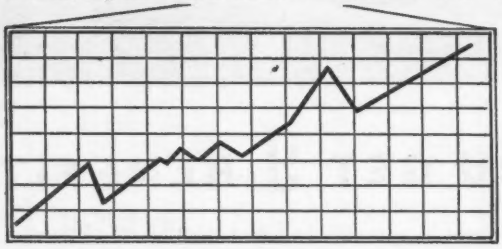
Standard design features include the Farrel patented crowning device which produces a mathematically correct curve for crowned rolls exactly symmetrical on both halves of the roll. The device is located on the rear of the grinding wheel unit, giving firm support for the wheelhead and removing any tendency to vibration at this point. Change gears are furnished to accommodate any length of roll within the capacity of the machine.

The grinder bed ways are of the inverted V-type, cast separately from the bed, and made of a special close-grained alloy iron of exceptional wearing qualities. Lubrication is by a separate motor-driven pump, and flexible metal covers exclude any foreign matter from the ways as well as from the screw located in the center of the bed.

The overall construction of the roll grinder gives it great strength and rigidity. Cast parts, including the bed, are made of Meehanite which is admirably suited to the purpose because of its superior vibration damping qualities.

This new type machine has been thoroughly tested in the Farrel-Birmingham roll shop, as well as in several paper mill installations, and is now scheduled for full production.

THERE MUST BE A REASON



• Mill operating men are hard-boiled—and they should be. They have to be shown *proved* performance before deciding on new equipment. Nichols can point to almost 4000 Vortraps in successful operation to back up their claims. Vortraps pay for themselves in materially reducing rejects and "seconds"; saving machine wires and screens and reducing wash-up time by eliminating dirt and abrasive grit from pulp and paper-making stock. They are economical to install and maintain, take up little space and have no moving parts.

Write for information.

NICHOLS

ENGINEERING & NERCO RESEARCH CORP.

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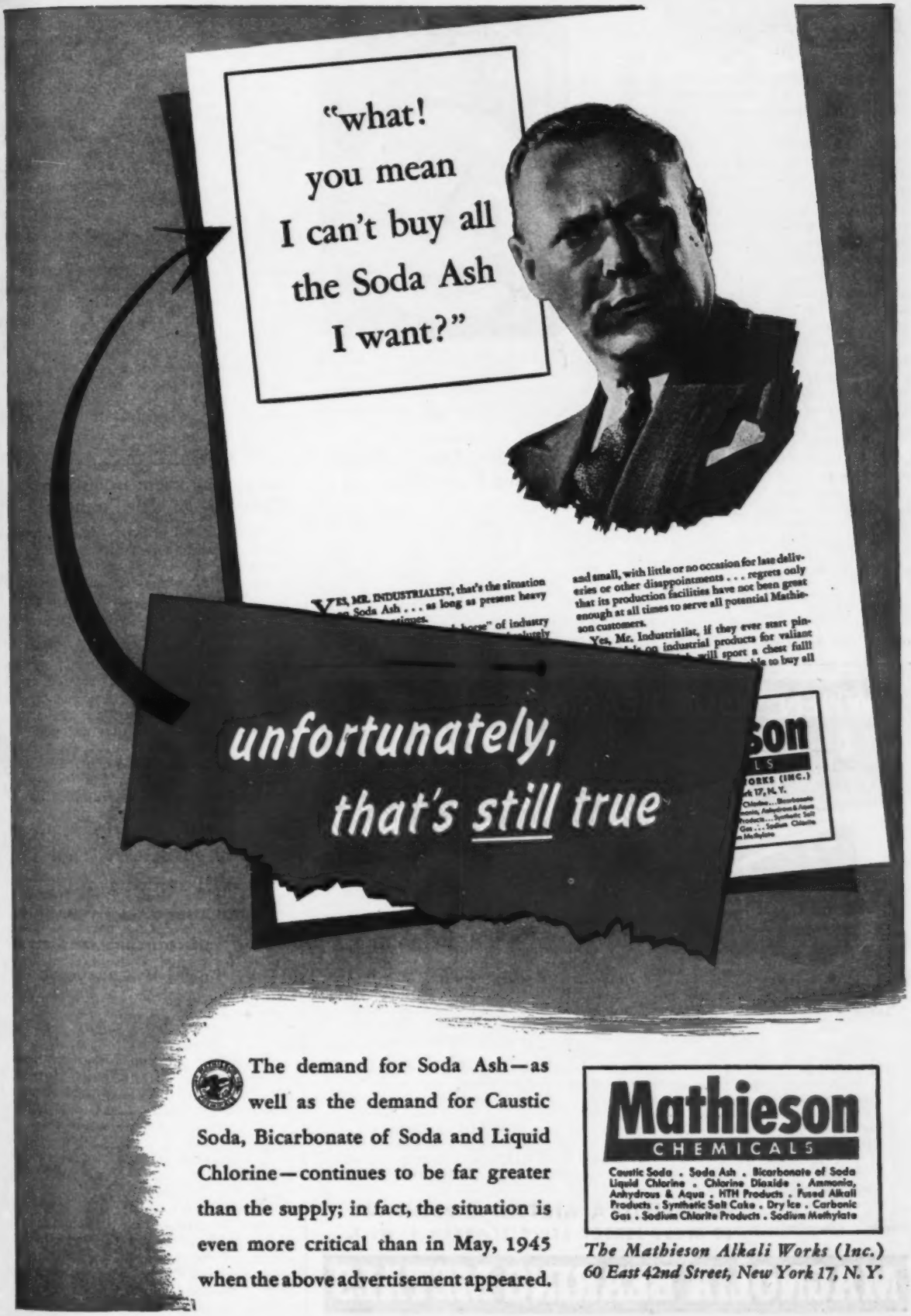
Affiliate of the American Pulp & Paper Mill Superintendents Association, Inc



The demand for Soda Ash—as well as the demand for Caustic Soda, Bicarbonate of Soda and Liquid Chlorine—continues to be far greater than the supply; in fact, the situation is even more critical than in May, 1945 when the above advertisement appeared.

Mathieson
CHEMICALS

Caustic Soda . Soda Ash . Bicarbonate of Soda
Liquid Chlorine . Chlorine Dioxide . Ammonia,
Anhydrous & Aqua . HTH Products . Fused Alkali
Products . Synthetic Salt Cake . Dry Ice . Carbonic
Gas . Sodium Chlorite Products . Sodium Methylate

The Mathieson Alkali Works (Inc.)
60 East 42nd Street, New York 17, N. Y.

Bailey Electronic Recorder Useful To Paper Pulp Mills

A standardized Electronic Recorder-Indicator which has many applications in the pulp and paper industry has been developed by Bailey Meter Company, Cleveland, Ohio. This instrument may be used to indicate, record or control speed or temperature. To measure speed the recorder is used in conjunction with a heavy duty magneto-generator. The generator is connected directly or by means of a V-belt or sprocket and chain drive to a roller or shaft. It is then connected electrically to the recorder. The recorder can be placed in any convenient location in the mill and is calibrated to record in rpm of the roller or feet of paper per minute or both.

To record temperatures of from —100F. to 1200F. the recorder is used as the Bailey Electronic Resistance Thermometer. This is accomplished by connecting the recorder to a temperature-sensitive resistance element. This temperature-sensitive resistance element is installed at the point of measurement and connected electrically to the recorder. As in the tachometer described above the recorder can be placed in any convenient location in the mill.

For temperatures up to 3000F. the Bailey Electronic Potentiometer-Pyrometer is used. This consists of connecting the recorder to a thermocouple.

This instrument also may be used to record conductivity, pH, level or flow. In these meters, too, electrical connections allow the recorder to be located anywhere in the mill.

Hexteel Solves Floor Problems Of Pulp and Paper Mills

To combat the severe wear and tear on floors of pulp and paper mills, impact, vibration, moisture and temperatures to which they are subjected, Hexteel heavy duty floor armor is particularly adapted. This heavy duty steel mesh is the product of Wm. F. Klemp Co., 6601 S. Melvina Ave., Chicago, Ill. It is especially designed to be imbedded in concrete or mastic over old or new concrete or wood floors. It is easily and quickly applied and filled flush. The steel mesh makes solid level, one-piece floors for longest service. Exposed steel surfaces take the brunt of traffic.

Hexteel is made in standard units 3' x 10'. Units to fit floor conditions are cut by the Klemp factory. It can be fitted around posts, columns or other obstructions. Units are in 12- and 14-gauge thicknesses and ¾", 1" and 1¼" depths. Joining is easily done from a standing position with tools loaned by the manufacturer. Concrete or mastic is "woodfloated" flush with top surface of grid, and troweled or tamped. Chipping, cracking, splintering, spalling and distintegration are eliminated. Ruts and potholes do not form. The floor is said to be practically maintenance free. Hexteel is also used to repair old floors. Bulletins of illustrations and drawings, with full instructions may be had by addressing Wm. F. Klemp Co.

Brown Instrument Issues Two Catalogs On New Products

The ElectroniK Strip Chart Potentiometer is the subject of the new catalog issued by the Brown Instrument Company of Philadelphia, a division of the Minneapolis-Honeywell Regulator Company. This important new development in temperature recording and control instruments is fully described and illustrated. Electronic "Continuous Balance" operating principle and resulting advantages of the ElectroniK Strip Chart Potentiometer are featured, as well as constructional details clearly shown in accompanying photographs. Also included in this new catalog are illustrated descriptions of the various types of Brown ElectroniK Potentiometers, Standard Speed, Fast Speed and High Speed; Con-Tac-Tor Auxiliary Switch Forms; the ElectroniK Potentiometer Controller; Precision Indicator and Thermocouple Assemblies. Other useful information can be found in the Control Forms chart and the list of Strip Chart and Scale Ranges. A copy of this new catalog will be forwarded on request; write to the Brown Instrument Company, Wayne & Roberts Aves., Philadelphia 44, Pa. Ask for catalog No. 5902.

The company has also just issued a new catalog on its New-Matic Remote Transmission Systems for applications where electrical transmission for indicating, recording and control of temperature, pressure, flow and liquid level is neither desirable nor permissible. This new 24-page booklet is profusely illustrated and carries several schematic diagrams of typical applications. Its operating features are fully explained and there is a comprehensive description of the component parts which make up the system. A section of the catalog is devoted to accessories used in the systems, such as control valves, orifice plates, reducing valves, charts, etc.

WHEN YOUR BEARINGS

WEAR

TOO FAST

MAGNOLIA ANTI-FRICTION METAL *for minimum friction under normal loads.*

Indications are that either

1. **lubrication may have been inadequate or**
2. **the bearing metal may have been improperly selected.**

In the latter case repour with MAGNOLIA ANTI-FRICTION METAL and improve your bearing life. It has a *lower coefficient of friction* than any other known bearing metal . . . 1/3 that of "genuine" babbitt. It is graphite impregnated by a special process and is to an extent self-lubricated.

MAGNOLIA ANTI-FRICTION METAL is recommended for all general purpose bearings where loads are comparatively steady and moderate, and speeds not excessive. Such conditions are usually found in bearings on line shafting, propeller shafts, general machinery, motors in the range between 10 and 250 hp. But before or when you order your next supply of MAGNOLIA ANTI-FRICTION METAL from your mill supply dealer, be sure to ask him or us for your copy of the MAGNOLIA BEARING METAL BULLETIN. It contains scores of application recommendations as well as valuable refresher information on how best to pour bearings.

Look for the Flower Trade Mark

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MAGNOLIA BEARING METALS

ARE YOU SHORT OF POWER

IN YOUR MILL? IF SO

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Continuous

BEATING AND

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CAN HELP, BY SAVING

SOME OF THE POWER YOU NOW HAVE

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TRENTON, NEW JERSEY • *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL, P.Q., Manufactured in Canada by The John Bertram & Sons Co. Ltd., Dundas, Ontario

Hendrick Produces New Screen Booklet

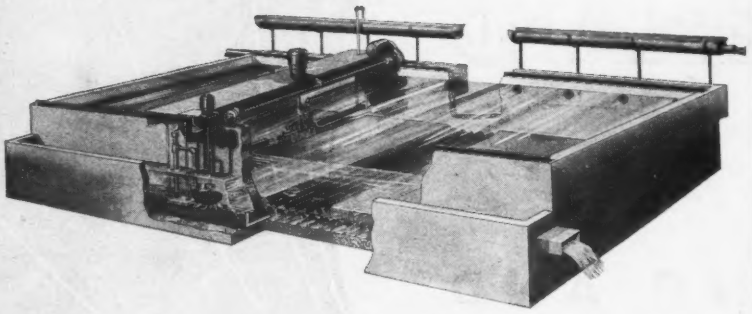
CARBONDALE, Pa.—Hendrick Manufacturing Company has issued a new 128-page catalogue, in color, of perforated metals, screens, and fabricated metal products. Actual-size illustrations are shown of 390 shapes and sizes of openings in perforated metal. These range, for example, from round perforations as small as .023 inch in diameter, with 400 holes to the square inch, to perforations 8½ inches in diameter.

Metal screens are made by Hendrick for a wide variety of industries, and include vibrating, flanged lip, milled-slot and wedge-slot screens, and screens for sizing and dewatering. Several catalogue pages are devoted to flights, conveyor troughs and elevator buckets.

There is a section on perforated metal grilles, of which Hendrick makes over 100 standard designs, and ornamental perforated metal for constructional and industrial uses. Other pages describe Hendrick's Mitco products—open steel flooring, Armorgrids, and Shur-Site treads for stairs—and Hendrick's plate and machine tool departments, with illustrations of typical products.

The catalogue concludes with 19 pages of useful tables for workers in any metal industry line.

king of the save-alls . . .



THE HARDINGE

Automatic Backwash

FILTER

Data submitted by *users themselves* in reply to a recent questionnaire proves the Hardinge ABW Filter has no peer for *overall efficiency* among "save-alls" used in paper mills . . . and *lowest operating costs* of all!

Hardinge ABW Filter owners report no shower clogging . . . no slime trouble through re-use of white water . . . definite improvement in appearance, strength, and color of the sheet when the recovered fibre is re-used.

WRITE FOR DATA

HARDINGE

COMPANY INCORPORATED

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Tube Turns Offers Fittings In Stainless Steel

One of the most complete lines of stainless steel welding fittings to reach the postwar market is now being manufactured by Tube Turns, Inc., Louisville, Ky., and is available through distributors located in all principal cities. The line includes 180 degree long radius returns, 90 degree long radius elbows, 45 degree long radius elbows, straight tees, reducing outlet tees, caps, eccentric reducers, concentric reducers, lap joint stub ends, laterals and crosses, all in standard and extra heavy weights; and welding neck flanges, slip-on flanges, threaded flanges, blind flanges, socket-type welding flanges, reducing flanges, orifice flanges and lap joint flanges. Sizes range from ¾ through 12 inches.

The fittings may be had in three grades of stainless steel; Type 304, containing 18% chromium and 8% nickel; type 347, containing 18% chromium, 8% nickel, and approximately 1% columbium; and type 316, containing 18% chromium, 8% nickel and 2% molybdenum. Type 316 is the most corrosion resistant of the three. In addition to improving the general characteristics of these steels, the molybdenum has increased resistance to the action of sulphurous and phosphoric acids, brine and hypochlorite solutions. It is especially popular for application in paper mills. Surveys conducted by Tube Turns' Engineering Service Department and other research groups indicate that these grades meet 95% of industry's standard requirements.

The introduction of Tube Turns' complete line of stainless steel welding fittings gives the users two sets of advantages each of which reinforces the other. They are:

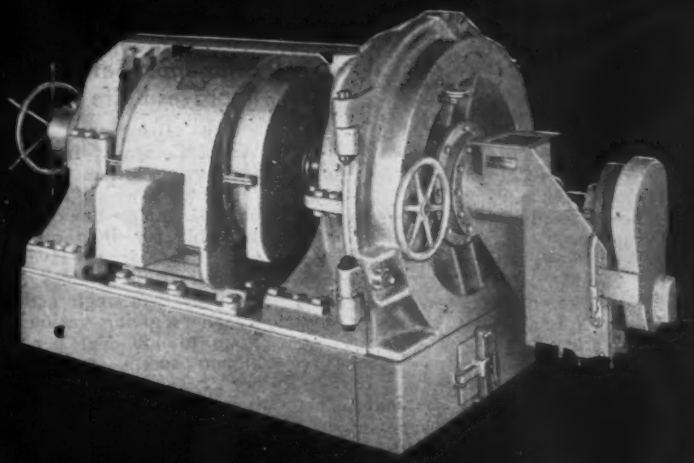
1. The inherent advantages of stainless steel itself. It resists atmospheric corrosion, acids and chemicals. It resists scaling at high temperature, and is strong and ductile at sub-zero and elevated temperatures. It has long life, reduces maintenance cost, virtually eliminates contamination and has a clean and attractive appearance.

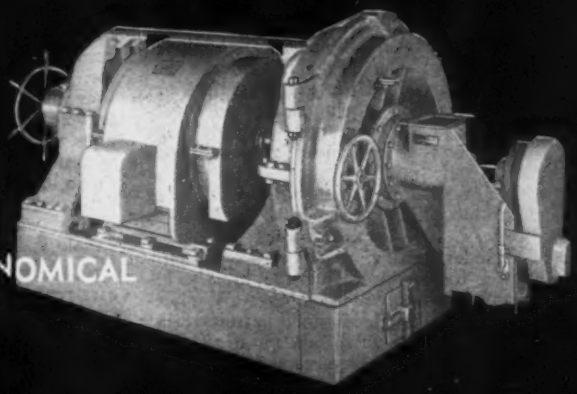
2. The advantages inherent in all piping systems fabricated with Tube-Turn fittings, whether of stainless steel, carbon steel, Monel, brass, copper or other metals: These are: leak-proof joints, less weight, minimum flow resistance, lower upkeep, greater strength and safety, more flexibility and streamlining.

Tube Turns originated and introduced the first welding fittings, in 1927, making what is regarded as the greatest single contribution to the efficiency of modern industrial and marine piping.

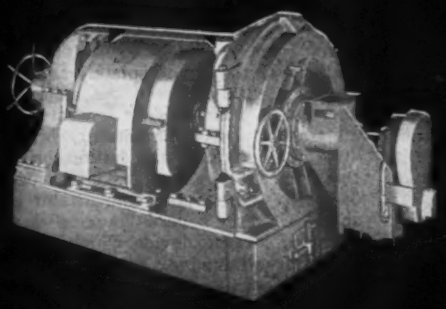
Tube-Turn fittings, including those of stainless steels, are forged by a patented process. The result is a close grained, uniform metal structure with no locked in residual stresses.

A REFINER
not just a cutter





Outstandingly
EFFICIENT and ECONOMICAL



Exceptionally versatile in its smooth power, the new, improved Sprout-Waldron 36-2 Refiner is capable of all operations from a straight defiberizing program to the actual refining of already processed fibers for fine papers.

Consultants first . . . then Manufacturers

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Manufacturing Engineers

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Get Sprout-W
dron's advice.
engineering know-
gained through years of
perience with the pulp and pc
industry can help you.

St. Regis Boosts Its Deferiet Output

(Continued from page 50)

Continuous Blowdown System — Henzey Company.

Boiler Feed Pumps—Ingersoll Rand Company.

Feed Pump Turbines—General Electric Company.

Feed Water Regulator — Cochrane Steam Specialities Company, Copes Flowmatic.

Boiler Instruments and Panel — Bailey Meter Company.

Air Compressors — Pennsylvania Pump and Compressor Company.

Combustion Control—Hagan Corporation.

Turbo-Generator — Westinghouse Electric and Manufacturing Co.

Pressure Reducing Station—Swartwout Company.

Treated Water Storage Tank—W. B. Caldwell Company.

General Equipment

Motors — Allis Chalmers Manufacturing Company, Reliance Electric Company.

Conveyors—Link Belt Company.

Electric Controls — Westinghouse Electric and Manufacturing Company.

Heating and Ventilating—J. O. Ross Engineering Corporation.

Pumps — Ingersoll Rand Company, Warren Steam Pump Company, Buffalo Pumps, Inc., Milton Roy Pumps, Allis Chalmers Manufacturing Company.

Piping — Lumsden and Van Stone Company, Johns-Manville Corp., National Valve and Manufacturing Company.

Tile Chests and Linings — Stebbins Engineering and Manufacturing Corporation.

Agitators—Improved Paper Machinery Corporation.

Special Valves — Locke Regulator Company, Wm. Powell Company, Hancock Valve Company.

Hoists—Industrial Equipment Company, Louden Machinery Company, Manning, Maxwell and Moore, Inc., Yale and Towne Manufacturing Company.

Steam Flow Metering—Bailey Meter Company.

Insulation—Johns-Manville Corp.

Buffalo pumps at Deferiet

Bridgeport Safety Emery Wheel Improves Knife Grinder Line

The Bridgeport Safety Emery Wheel Company, Inc., of Bridgeport, Connecticut offers a number of new refinements which are now available on the complete line of Knife Grinders available for Pulp and Paper Mills. On the large Hydraulic Knife Grinders, the tables are reciprocated by two, single acting, Hydraulic Cylinders giving various speeds from 5 up to 150 feet per minute. The higher speeds permit the use of harder abrasive segments in the Grinding Wheels and provide faster grinding with increased abrasive economy. In addition, all controls are centralized in a conveniently located Control Panel where they can be instantly changed by the operator while he is controlling the grinding operations. The use of these high production Hydraulic Grinders, equipped with revolving Magnetic Chucks has greatly reduced the grinding time per knife while, at the same time, providing a sharper more durable edge on all types of knives used in paper and pulp mills.

For smaller paper mills, with lower production requirements, Bridgeport offers a complete line of Knife Grinders using mechanical transmission for reciprocating the table. This transmission, which employs a Carlyle-Johnson Double Clutch, permits table reciprocation at speeds up to 70 feet per minute. Various models are available using wheels up to 26" in diameter and all models can be furnished with stationery or revolving Knife Bars, both plain or magnetic.

All Bridgeport knife grinders feature the patented Bridgeport sectional grinding wheel consisting of abrasive seyments mounted in pockets on a cast steel chuck. The patented shape of the segments gives a shearing action during the grinding operation and provides a very efficient method for the prompt removal of grit and sludge from the grinding operation. These sectional wheels are available in sizes from 16" up to 60" in diameter. A new general catalog, which covers all of its standard line of knife grinders with specifications and photographs, may be obtained by writing the company at the above address.

Berkshire Papers Celebrates Its Second Decade

CHICAGO—Berkshire Papers, Incorporated, has drawn a big circle around December 6 as the occasion for two happy milestones in the progress of the well known Chicago distributor headed by Hamilton Vose, Jr. Guests will "drop in" on the 6th, to help Berkshire celebrate not only its twentieth anniversary but also to pay homage to the construction program which is now concretely represented by materially expanded facilities and space at 1520 W. Fulton Street, on Chicago's west side.

G-E Offers New Line Unit-Cooled D-C Motors

A new line of unit-cooled, totally-enclosed, direct-current motors especially designed for operation in severe atmospheric conditions such as prevail in steel mills, cement and paper mills and coal and coke plants is now offered by the General Electric Company. The new motors are available in sizes 15 to 200 horsepower at popular speeds and voltages.

A unique feature of the new line of motors is the dual ventilating system, which utilizes a compact unit cooler operating on a principle similar to that of an automobile radiator except that air instead of water is used for cooling. The unit cooler has two sets of air passages arranged at right angles to each other. A fan on the armature circulates air through the motor and through one set of passages forming a completely enclosed system. External air, maintained at a constant rate of flow by an auxiliary motor and fan, travels through the other set of pasages to absorb heat from the enclosed system. By utilizing this principle, a totally-enclosed construction is achieved without external duct work, piping, air filters or pressurized air supply.

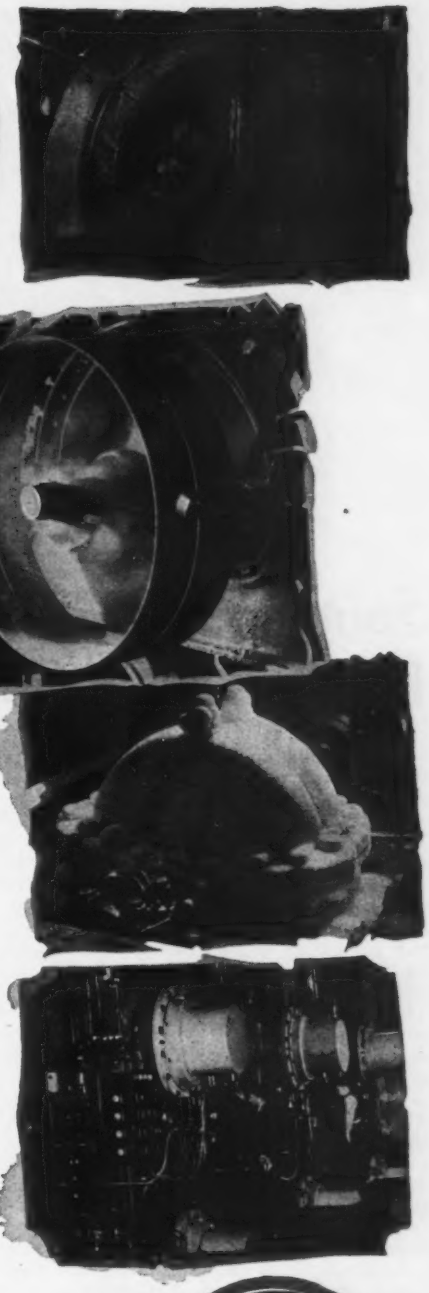
A thermostatic relay located in the airstream of the enclosed system protects the main motor in case of failure of the auxiliary motor power supply or accidental restriction of the air intake. Installation of the unit-cooled motor is as simple as the conventional open d-c motor, since the unit cooler is completely assembled and mounted on the main motor at the General Electric factory.

Maintenance is reduced by the enclosed construction of the motor, which protects vulnerable current-carrying parts from injurious air-borne materials. Even though completely enclosed, however, vital parts of the motor are accessible for periodic maintenance and inspection. Commutator, brushes and brush rigging can be reached by removing steel-plate gasketed covers on both sides of the commutator end shield. These covers have a hand-operated locking device which permits removal without tools.

The new motors can be furnished with either ball- or sleeve-type bearings, depending upon service requirements. The ball bearings are completely enclosed in dust-tight and grease-tight cast iron housings having ball-type pressure fittings and a pressure-relief greasing system. The sleeve bearings have a special spiral grooving with ring oil lubrication. They are pressure equalized to prevent any tendency toward oil leakage by seeping along the shaft.

Constant speed motors in the new line are available with shunt, stabilized shunt or compound windings. Adjustable speed ratings are shunt or stabilized shunt wound.

"Bearings RUN 10% COOLER



SINCE CHANGING TO Tycol industrial Greases"

"Production speeded 65%...
Repair costs slashed 30%...
Deposits eliminated...
Highly stable—doesn't leak...
Consumption cut 25%..."

This report from a plant engineer typifies the kind of trouble-free, cost-cutting lubrication provided by Tycol Industrial greases. They contain more high-grade cylinder oil — less soap — which means better performance in every application.

For aid in the selection of Tycol greases best suited for your particular needs, contact your nearest Tide Water Associated office today.

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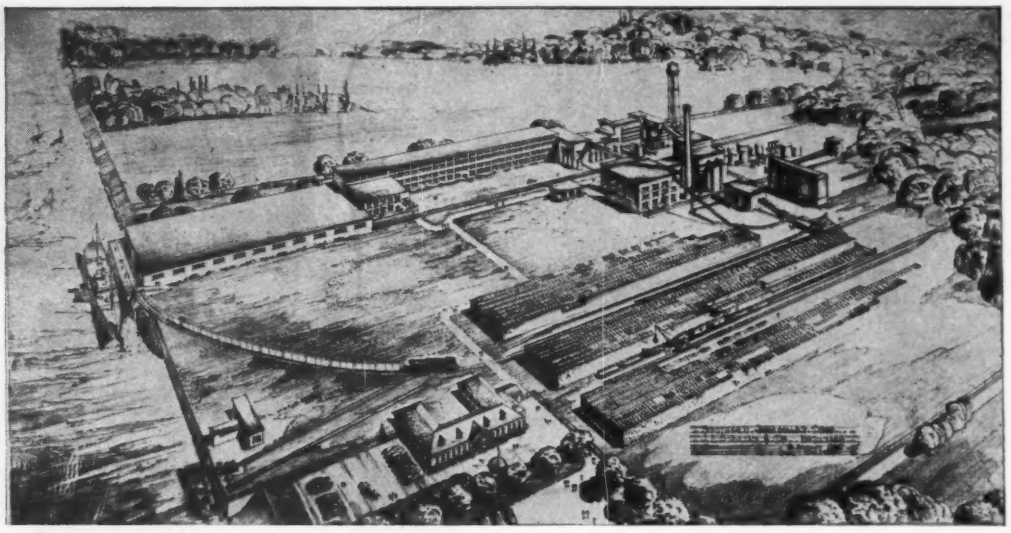
17 BATTERY PLACE NEW YORK 4, N. Y.

LUBRICATION—"ENGINEERED TO FIT THE JOB"



Southern Paperboard Starts Its New Mill Near Savannah

One of the major projects of the industry, so far as they have been made public, actually got under way last month when ground was broken at Port Wentworth, Ga. for the big new mill of the Southern Paperboard Corporation. This enterprise, a new member of the vast Gair interests, occupies a site seven miles northwest of Savannah, on a tract of land facing the Savannah River and adjacent to the Southern Coastal Highway No. 17. This tract comprises approximately one hundred sixty acres, of which seventy-seven acres will be fenced in for the mill and its facilities. Rail service will be available from the Savannah and Atlanta Railway which connects with all the other lines in Savannah; and a dock is to be built to give deep water shipment of finished products, as well as receipt of incoming materials such as wood, oil, and chemicals. Details of the proposed operation have been supplied by D. G. Moon, Consultant Engineer of J. E. Sirrine & Company, Greenville, S. C.

Process water for the mill will be furnished from the new filter plant to be built by the Savannah Industrial and Domestic Water Supply System, which is to furnish the board mill with a minimum of ten million gallons per day of clear, soft, potable water.

In general, the mill is designed to produce an average of four hundred fifty tons of liner board and similar products. However, the supporting facilities for the manufacture of pulp, power, and the recovery of chemicals is provided for in such a manner that the full capacity of the two hundred thirty-six inch paper machine to be installed can be ultimately obtained.

Particular attention has been given to the design of the pulp mill and stock preparing facilities. These have been arranged so that different classes of wood may be treated entirely separately throughout and combined into blended furnishes, as desired. Provision has been included in the design for the later addition of a bleach plant, a second paper machine, and a converting plant for the manufacture of corrugated boxes.

The buildings generally will be of steel frame, concrete foundations, floors, and grade beams, with eight inch brick curtain walls and corrosion-proof sash, and enclose approximately ten million cubic feet with an area of two hundred sixty thousand square feet.

Roofing will be of precast light concrete slabs, overlaid with insulating board where required. Corrugated asbestos siding will be used for some of the temporary walls, sheds, and in the canopy or open type construction developed in the design of the recovery, digester, and wash buildings. Foundations will consist of concrete footings on Raymond cast-in-place concrete piles, with spread footings for the lighter loads.

Approximately three thousand piles; thirty-five hundred tons of steel; twelve thousand cubic yards of concrete; and seventy thousand square feet of sash will be required in the buildings and foundations; also about twenty-five miles of pipe will be installed.

The general facilities to be provided for the operation of the mill are as follows:

The wood yard is arranged for the storage of a minimum of fifteen thousand cords received by rail, water, or truck in such a way that the handling into or out of storage will be within the range of locomotive crawler or truck cranes. Provision is also to be made for the handling and cutting into the conventional lengths of long logs.

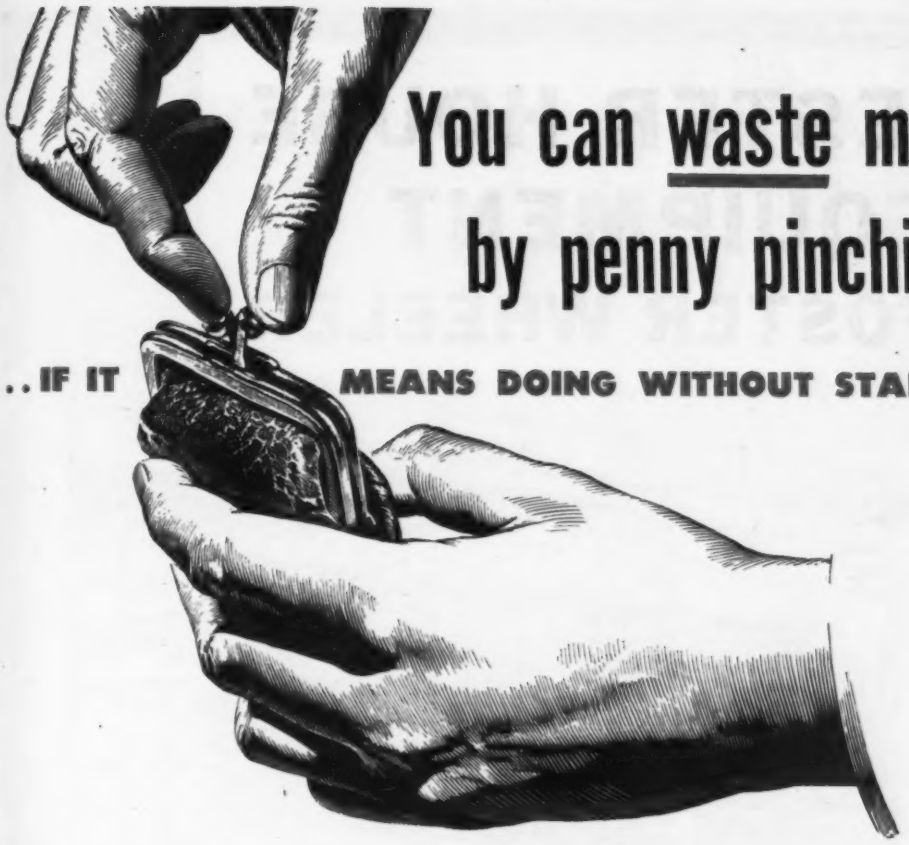
Five steel conveyors, four of which parallel railroad tracks, and one of which will receive wood brought in by barge, carry the wood to two 12-foot by 45-foot barking drums, the rossed wood from which will be delivered onto a sorting conveyor for the cleaning or rejection and return of unbarked wood, the clean wood being sent to two 88-inch, ten knife chippers, thence through small storage and feeder bins onto a belt conveyor to a ground storage chip bin having twenty-four hour storage capacity.

Each drum with its conveyors, chipper, and screens, is arranged as a separate unit so that, if desired, pine can be run through one line while hardwood is run through the other and segregated in the ground storage bin by suitable partitions.

The ground storage bin will be of steel construction, with large openings on the bottom to prevent arching of the chips. Feeders from these openings will deliver chips onto a belt for distribution of the proper amount of wood into each digester, after passing through a weightometer. In this manner, the wood chips from any section of the bin can be delivered to any of the digesters, as desired.

Bark and sawdust from the yard and wood room operations will be collected onto conveyors and sent through a hog for delivery to a bark burning boiler. Special provision is to be made for cleaning the bark from under the conveyors and for the storage and reclaiming of surplus refuse.

For the cooking of the wood chips, six welded steel digestors are to be provided, each having a capacity of over ten tons of pulp per charge. Any of these six digesters can deliver into either of the two blow tanks, so that



You can waste money by penny pinching

..IF IT MEANS DOING WITHOUT STAINLESS STEEL

THERE are a number of materials you can use in your mill equipment that are lower priced than Stainless Steel.

You pay less for them—but you also get less. Less resistance to the attack of corrosion and abrasion. Less protection from contamination. Less service life. (The only thing you get *more* of, with these less effective materials, is more and larger maintenance and replacement bills.)

Do you know why the application of Stainless Steel in the sulphite pulping process has been called the most important development in the field of pulp and paper mill materials?

It is because Stainless Steel is more durable. Because it is unsurpassed for safe-guarding the quality of the product. Because there are certain parts of your equipment where Stainless Steel, despite its sometimes higher cost, is by far the most economical to use. For example:—

- **Take digester strainers. They corrode and erode rapidly or give trouble from rapid lime scale formation. When made of U·S·S Stainless Steel these difficulties have been retarded or disappeared entirely.**
- **Digester outlet nozzles are subject to severe abrasion. Lined with light gage U·S·S Stainless they take on a new lease of life.**
- **U·S·S Stainless Steel tubes in the first effect of sulphate evaporators have lasted 16 times as long as carbon steel tubing.**
- **In cylinder molds, washers and save-alls, U·S·S Stainless Steel winding wire and wire cloth has extended life from weeks to years.**

Our engineers are specialists in the use of Stainless Steel. They will be glad to show you where U·S·S Stainless can be applied in similar money-saving applications in your mill.

U·S·S STAINLESS·STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

USS STAINLESS STEEL — UNITED STATES STEEL

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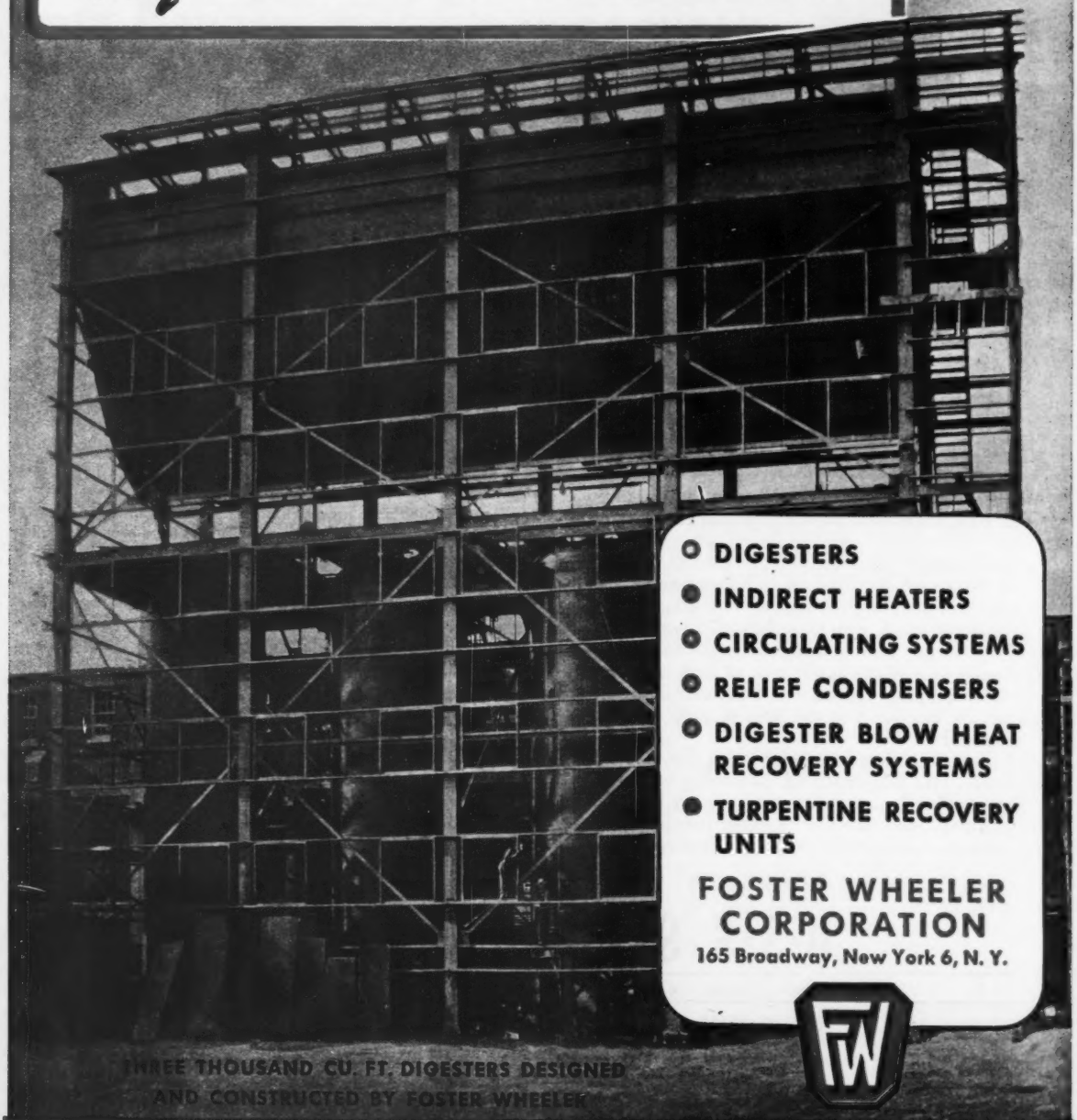
UNITED STATES STEEL

DIGESTER HOUSE EQUIPMENT *By* FOSTER WHEELER



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- INDIRECT HEATERS
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THREE THOUSAND CU. FT. DIGESTERS DESIGNED AND CONSTRUCTED BY FOSTER WHEELER

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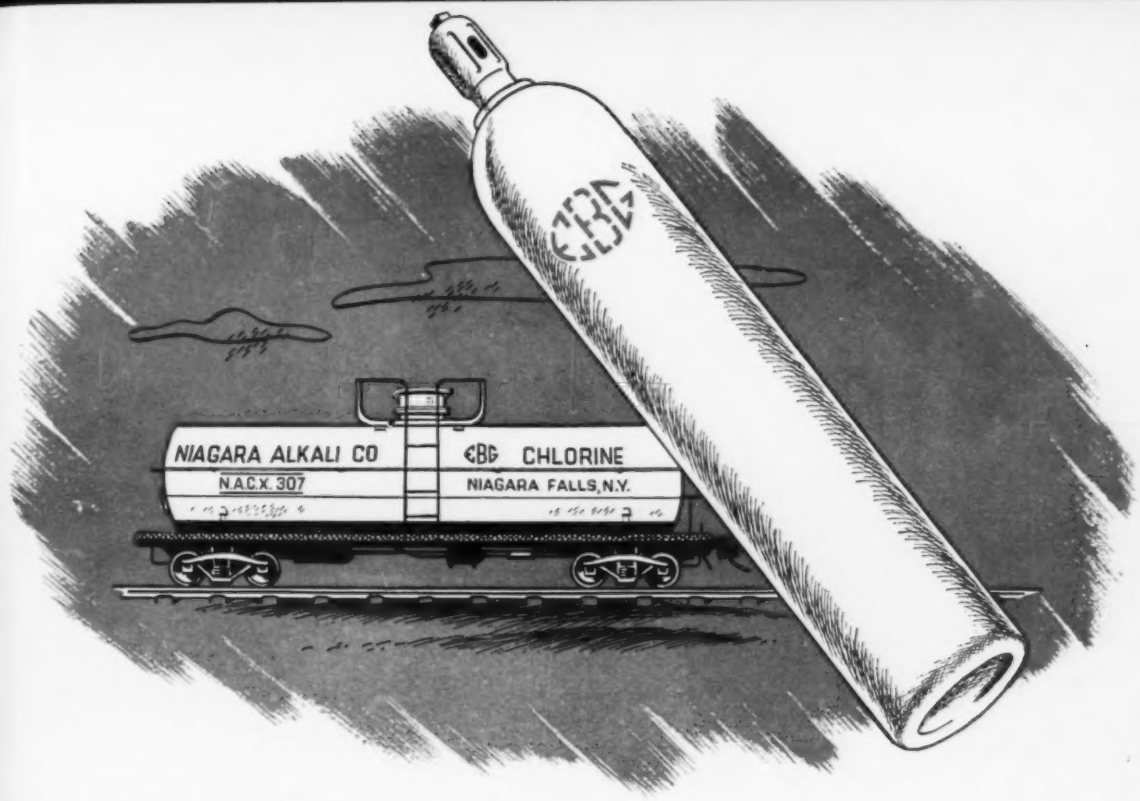

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As the first American producer of this chemical and a pioneer in electrochemical product development, Niagara's service in Liquid Chlorine is backed by advanced knowledge and experience that can be of continuous value to you in obtaining the best results from its use.

A new 48-page booklet giving essential data on the uses, characteristics, physical properties and handling of Niagara EBG Liquid Chlorine is available on request. ⁂ Niagara Alkali Company, 60 East 42 Street, New York 17, N. Y.

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CAUSTIC POTASH • CAUSTIC SODA
CARBONATE OF POTASH
LIQUID CHLORINE • NIAGATHAL
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two classes of cooks with separate woods can be made at the same time.

Full automatic control, as well as manual, will be provided for the delivery of chips, the cooking cycle and the relief discharge, which latter will be condensed for the recovery of turpentine.

The steam discharged from each digester blow will be passed through a separating cyclone and thence through a heat reclaiming system where it will be condensed and used as a medium for heating clean incoming water for wash purposes.

Wash Room

For the de-liquoring of the pulp, two lines of vacuum type washers will be provided. One of these lines will consist of four 8-foot by 14-foot washers, for the removal of liquor from the quick cook or base stock requirements; and the second line will consist of three 8-foot by 12-foot washers for treatment of long cook, hardwoods, etc., as may be desired.

These washers will be set at the same elevation as the digester room floor, with the drop legs carried down to round horizontal tanks extending into and through the wash building, with the various liquor pumps placed under the tanks. Full provision has also been made for the removal of foam and the collection of soap.

Vibrating type pre-knotters are being placed ahead of the washers in order to improve the mat formed on the cylinders, with resulting economy in washing. The rejected knots will be taken by gravity through a small jordan for breaking up and return through the system; any further rejects ultimately coming out with the tailings from the screens.

The washers will be provided with hoods for the removal of vapor and a full complement of automatic control instruments, including consistency regulation and metering of the incoming stock. For ease of erection and removal of cylinders, a hand-operated crane is to be installed above the washers; and a small elevator will serve the digester and wash room floors.

The final washed stock will be brought by gravity into two separate concrete storage chests, each of 15-ton capacity, equipped with propeller type agitators. While the operating floor of the wash room is to be bricked in and conditioned, canopy construction will be used for the underlying walls.

Screen Room

The two classes of stock from the two washed stock storage chests will be pumped through independent mix tanks, volume meters and consistency regulators to a flow box feeding seven centrifugal screens, arranged so that as many screens as are desired may be apportioned to either stock, with one screen common to the tailings from both.

The final rejects and tailings from these centrifugal screens will flow by gravity through a thickener into a small surge chest, from which they will be pumped through refiners into the base liner washed stock chest for recirculation.

The accepted stock from the centrifugal screens will flow by gravity to three 8 by 12-foot vacuum deckers, two of which will thicken the stock for the base liner and deliver by gravity into a screened stock storage chest of 20-ton capacity. The third thickener will be used in conjunction with the second line of washers and screens for delivery into a separate chest, also of 20-ton capacity.

White water from the thickeners will be carried by their drop legs into a concrete storage tank placed under their respective stock chests. Separate white water recirculating pumps will be provided for each line.

Refining

For the final preparation of the stock before going on to the paper machine, fourteen jordans with 400 horsepower motors are to be installed and interconnected to give the maximum of flexibility in respect to the requirements for each grade of pulp.

Normally eight of these jordans will be used for hydrating the base stock and three for the secondary stock, discharging into their respective concrete storage chests, from which they will be pumped through finishing jordans, with two on the base stock and one on the secondary. A separate chest will also be provided for gum or hardwood pulp, with provision for separate refining and final combining of the two pulps ahead of the fan pumps, delivering to the paper machine.

Arrangements for consistency regulation ahead of the jordans and a close control of the latter by instrumentation will be included, with the size and alum received, stored and applied in liquid form.

The refining room building will be served by a 5-ton overhead crane.

Paper Machine

The 236-inch high speed, Fourdrinier kraft liner board machine will be of the most modern type and arranged for speeds up to sixteen hundred feet per minute.

The flow box will be a three-pass, stream lined design, with 120-inch slice.

The Fourdrinier part will be suitable for a wire 120 feet long and 236 inches wide, arranged for installing a wire from the tending aisle without necessity of removing the Fourdinier proper. The breast roll will be 28 inches in diameter; table rolls, 10½ inches; ten 12-inch suction boxes and a special double box, suction couch roll 44 inches in diameter, having one suction box 7 inches wide and the other 12 inches. There will be included also a secondary head box unit for applying a top film of stock to the base sheet; also the latest type high speed, duplex shake with two units.

For the press part there will be two sections, each with a rubber covered upper roll 30 inches in diameter, and a rubber covered lower roll of the suction type 36 inches in diameter, all connected with a pneumatic type loading system to properly distribute weight on the bottom rolls as desired.

The dryer part will be arranged in four sections with twenty 60-inch dryers in each; six 60-inch felt dryers in the first two sections and two similar in the third and fourth; and all journals will be of extra heavy duty, self-aligning rollers.

The driving train will be of the fully enclosed type with all dryers in the lower tier of each section horizontally connected together by intermediate idler gears which, in turn, drive the upper dryers by means of idler pinions, all arranged for lubrication by a central oil lubricating system.

Following the dryers there will be two stacks of calenders having eight rolls each, with pneumatic type loading system for applying pressure to the journals at the top of the roll. The first stack will be arranged for two water boxes.

Between the two calender stacks there will be three 60-inch diameter calender dryers.

The reel will be of the uniform speed type with 42-inch driving drum and six reeling drums.

For the final rolls, a two-drum, uniform speed winder suitable for taking rolls up to 72 inches in diameter will be provided, of the latest type with anti-friction bearings throughout and balanced for speeds up to four thousand feet per minute.

The sections of the machine requiring variable speeds will be driven by a sectionalized individual motor drive having electronic control, the motors for which will obtain their current from two 900 horsepower motor generator sets, with a separate generator for each section of the machine.

The winder drive will be of the regenerative braking type with a 300 horsepower M.G. set and one 150 horsepower motor on each of the winder drums.

Air conditioning and removal of vapor from the machine room will be accomplished by a transite hood over the dryer section, with eleven exhaust fans and two large heater and supply fans providing seventy-five per cent of the total make-up air requirements.

For providing the necessary vacuum on the flat boxes, suction couch, and presses, six vacuum pumps are to be installed aggregating 1125 horsepower.

The fan pump for the base stock of the machine will probably be one of the largest yet installed, having a capacity of forty thousand gallons per minute and will be driven by a variable speed motor. The fan pump for the secondary head box will be for ten thousand gallons per minute.

White water recovered from the paper machine and not recirculated will be returned to the screen room ahead of the pulp thickeners.

Broke from the paper machine will be conveyed to a breaker beater with

64-inch roll for the return as pulp to the base liner machine chest.

A full complement of auxiliaries of the latest type will also be included, such as for the conditioning of felts, removal of condensate, oiling and instrument control.

The machine room building itself, including its extension for roll finishing, will be 630 feet long and 70 feet wide. While it will be built to house a single machine initially, it is so designed that it can be readily expanded for a second machine.

For servicing, the paper machine there will be a main electrically operated crane running the full length of the building, equipped with two 17½ ton trolleys for the handling of the largest rolls to a grinder located in the basement at the dry end of the building. A 15-ton electrically operated crane for the handling of rolls from the reel to the winder and a 5-ton hand operated crane for the back drive are also included.

Rolls coming off the end of the paper machine will be banded and passed in echelon over a floor scale somewhat wider than the full width of the paper machine. From the scales, the rolls will pass onto a 12-ton elevator, with 24-foot by 10-foot platform, for delivery to the basement and into roll storage by tiering lift trucks. This elevator will also be large enough to take a lift truck and its load from the machine room floor to the basement, if necessary.

Rolls to be rewound will be handled by the main crane to a 100-inch rewinder, the finished rolls from which will return onto the eelvator.

The machine shop and storage building will project towards the railroad track from the dry end of the paper machine, and will be provided with a 35-ton trolley crane extending from over the railroad tracks into the machine room so as to give handling of rolls or equipment from cars to the machine room crane for distribution at any point. Auxiliary cranes in the machine shop will also be arranged to pick up materials from the basement floor or from the main 35-ton trolley and service the various machine tools which will be located on the main floor level. The basement under the machine shop wil be used for storage and wash room facilities.

The space between the extended fan platform of the machine room and the machine shop will be occupied by air conditioned offices for supervisors, with a maintenance office and drafting room on the upper floor.

Roll Handling

As a continuation from the machine room and the machine shop toward the River, a roll storage building with a capacity for ten thousand tons will be constructed. This building will be 460 feet long on the side paralleling a serviving railroad track in a train shed, and 220 feet wide, with the River end fronting a dock which will be built for a channel depth of 32 feet to take care of deep water shipments down the Savannah River and its terminals.

Recovery of Chemicals

Black liquor recovered from the washing operation is to be stored in two tanks, 30-foot diameter by 32-foot high, and pumped continuously to a sextuplet long tube black liquor evaporator, receiving the liquor at sixteen per cent solids and discharging it at from fifty to fiftyfive per cent to concentrated liquor storage tanks, from which it will be pumped through a Cascade type evaporator and finally delivered to the spray nozzles for burning in a modern type black liquor recovery and steam generating unit.

There will be two of these recovery boiler units, each having a capacity for burning 650,000 pounds of solids per day and generating steam at 625 psi, 700°, to tie in with that generated by the main boiler plant.

The hot waste gases from the recovery boilers, after passing through the Cascade evaporators, will go through four Cottrell electrical precipators before entering the stack for the recovery of soda that would normally be carried off in these gases. The dry recovered salt cake from the precipitators will be conveyed to a mixing tank where it will be mixed with either the weak wash from the causticizing plant or weak black liquor and when built up to sufficient concentration will be returned into the disc evaporators.

Black liquor soap removed at relatively low concentration from the foam tanks of the black liquor washing operations will be taken off and combined with the feed to the sextuplet steam evaporator and then removed again between the effects of this unit for delivery to a skimming tank where the final soap will be skimmed off and stored for shipment, the excess remaining liquor returning to the evaporators.

Make-up salt cake requirements will be handled by a pneumatic system from railroad cars into storage and the salt cake mixing tanks where it will be combined with black liquor for feeding into the recovery units.

The multi-effect evaporators are to be the self-suporting type and will be placed in the open immediately outside the recovery boiler building so that an automatic control, combined with that for the recovery unit, can all be handled at one centralized point.

The chemicals reduced by the recovery units are delivered in the form of molten smelt into dissolving tanks where they are mixed with recovered weak liquor from the subsequent recausticizing operation required to form green liquor.

The green liquor from the dissolving tanks will be pumped into two storage tanks, each 36-foot diameter by 24-foot high. Before using this green liquor in the causticizing operation it will be clarified in a tray type thickener 35-foot diameter by 24-foot high and the resulting dregs from same further washed for the recovery of soda in a tray, having a classifier for the removal of grits.

The milk of lime from the slaker is to be pumped up to elevated causticizing tanks, 12-foot diameter by 10-foot high, arranged in series and discharging by gravity into a tray type white liquor clarifier, 35-foot diameter by 24-foot high, with the clarified white liquor from this unit returned to two storage tanks, 36-foot diameter by 24-foot high, where it will be available for re-use in the digesters.

The settled mud from the white liquor clarifier will be further washed in a tray type thickener, 35-foot by 24-foot, for the recovery of chemicals and the final resulting sludge delivered into a lime mud storage tank, 20-foot by 20-foot, from which it will be pumped over two 6 by 6 vacuum type mud filters for delivery into an oil fired kiln, 8-foot diameter by 300-foot long, thus giving reburned lime for the major portion of that required in the slaking operation.

The small amount of fresh make-up lime that will be required to replace that lost in the relatively closed system will be handled from railroad cars into a storage tank by pneumatic handling system and delivered into the slaker in conjunction with the reburned lime in automatic measured quantities continuously.

The weak liquors resulting from the various washings in the recausticizing system will be collected and stored in a tank 36-foot diameter by 24-foot high, fore recirculation to the dissolving and other liquor tanks, in conjunction with the black liquor recovery unit.

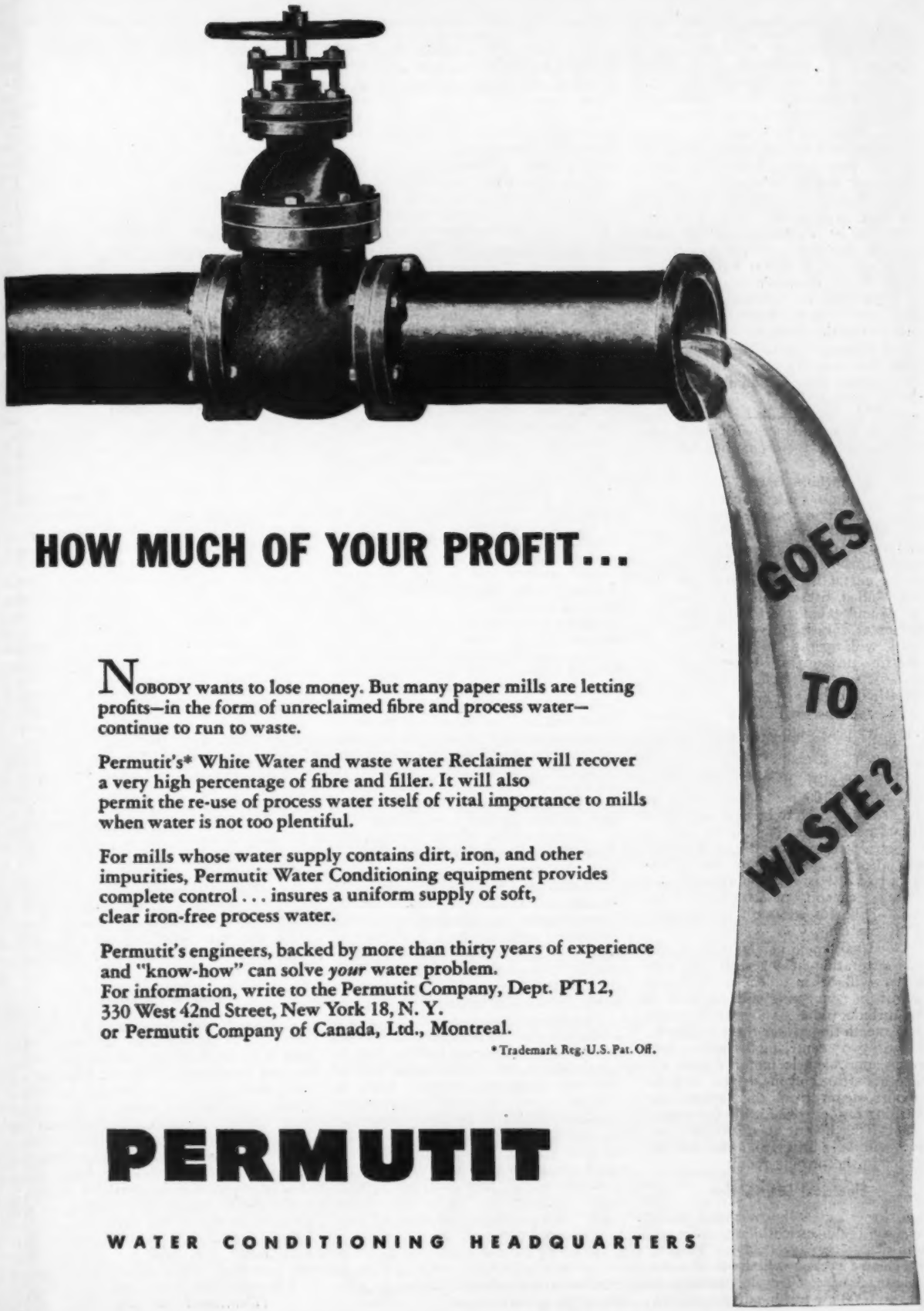
It is anticipated that the continuous causticizing system will reduce the chemical losses therein to not to exceed 4.5 pounds of soda per ton of pulp produced and also that the long kiln will produce a ton of new lime with not to exceed eight million Btu for fuel consumption. The lime dust carried out by the exit gases from the kiln will also be recovered by the wet processes and returned into the system.

The controls for the continuous causticizing operation will be located in an enclosed room near the slaker at about the center of the operations, the balance of the equipment except for the lime mud filters, being in the open.

Power Plant

The power plant is to be divided into three units; that is, boiler room, turbine room, and recovery room. The boiler and turbine room will be adjacent buildings and the recovery room will be a building very near the boiler and turbine room, connected by a passageway in which auxiliary equipment will be located.

The boiler room will have installed in it two oil fired Integral Furnace Power Boilers, each approximately 1500 horsepower. The third boiler will be a duplicate of the two power boilers but with the addition of a Hofft furnace for burning bark and sawdust. This third boiler will be capable of developing the same amount of steam as the power boilers when using oil



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NOBODY wants to lose money. But many paper mills are letting profits—in the form of unreclaimed fibre and process water—continue to run to waste.

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PERMUTIT

WATER CONDITIONING HEADQUARTERS

alone or firing with a combination of oil and wood refuse. The boilers will operate with steam at the superheater outlet of 625. pounds per square inch pressure and 700 degrees Fahrenheit total temperature, with a feed water temperature of 230 degrees Fahrenheit.

Provision has been made for the installation of a fly ash eliminator for the wood refuse burning boiler between the air heater and the induced draft fan.

The burners on all boilers will be of the dual type so designed as to burn either oil or powdered coal. Oil, which is to be used initially, will be delivered by barge to a 12,500 barrel storage tank, 50 ft. diameter by 37 ft. high, and pumped to auxiliary measuring tanks, one near the boiler house and the other near the firing end of the kiln.

All three of these boilers, together with the recovery unit, will discharge their gases into a radial brick stack 250-ft. high and 14-ft. diameter at the top. This stack will be lighted and marked in accordance with the regulations of the Civil Aeronautics Administration.

In the turbine room there will be installed one 6000 kw turbo generator of the extracting non-condensing type. Steam will be automatically extracted at 150 psi and exhausted at 50 psi. The second turbine of the same capacity, but of the extracting condensing type, will be installed. Steam will be extracted at 50 psi and exhausted to a surface condenser at 27½ in. mercury. These turbines will operate in parallel on the electric end and are designed for 600 psi—675 degrees F TT steam at the throttle of each.

The condenser will be of the surface type, two-pass and with divided water boxes, and will have a total surface of 7500 square feet.

Installed also in the turbine room will be two 100 psi motor driven air compressors, each to have a capacity of 542 cfm free air, and to be used to supply air throughout the mill. There will also be installed in the turbine room two 350 psi air compressors, each having a capacity of 300 cfm free air, and will be for use with the recovery "Puff System."

A 600,000 pound per hour horizontal type deaerating heater with vent condenser will be installed in the upper part of the connecting building between the turbine room and recovery room. Underneath this heater there will be installed two centrifugal boiler feed pumps, one electric motor driven and the other steam turbine driven, with the exhaust steam from the turbine discharging into the deaerating feed water heater. The throttle steam for this turbine will be taken from the 150 psi header in the turbine room.

Electrical Distribution

For the 21,000 hp installed motor capacity, the electrical distribution will be in two voltage level classes. The first or primary system will be 4160 volts, 3 phase, 3 wire, 60 cycle, supplied by the two 6000 kw turbine driven generators. It will serve direct, motors rated 200 hp and larger as well as a number of unit type of substations. The second, or secondary, system will be 480 volt, 3 phase, 60 cycle, supplied by the unit type substations. It will serve motors rated 150 hp and smaller, as well as form the primary distribution system for building lighting.

The primary distribution will be the radial type, with its control, together with the generator controls, placed in totally enclosed, metal clad switchgear placed in the turbine room and arranged for the outgoing circuits to correspond to the manufacturing departments. Outgoing circuits will radiate from the switchgear to strategically placed control rooms wherein are located the unit type of substations and motor starting equipment.

The transformer and secondary distribution controls will be combined into load center unit substations wherein the transformer and control equipment will be close coupled and all interconnections wholly enclosed.

In general, full voltage magnetic starters will be used throughout. Those for the 4160 volt motors will have oil immersed contacts and will be fitted with high interrupting capacity current limiting fuses, all mounted in self-supporting steel enclosures. The 440 volt motor starters will be the air circuit breaker magnetic combination type, several of which will be grouped together in steel structures known as a motor control center. Both the high voltage and low voltage starters will be placed either in the same rooms with the load center unit substations or in adjacent rooms. Thus all of this equipment will be kept out of the manufacturing areas, will be out of the way, easily accessible for maintenance, will be under control of only authorized persons and fully protected from excessive moisture conditions. Remote control push button stations in watertight cast iron cases will be placed at each machine for the operatives to start and stop the motors.

In effect the low voltage distribution system will consist principally of the circuits from the motor starter to the individual motors, which in addition to others, will have the advantage of reducing to a single motor partial shutdowns caused by trouble that might develop in any one circuit.

Fluoresceint lighting will be installed in those areas where conditions permit; otherwise incandescent lighting will be used. The lighting distribution will be 480 volts primary, stepped down to 120/240 volts with small transformers conveniently placed in the manufacturing buildings, and arranged for subdivided control limited to relatively small areas. In addition to the general lighting system, there will be a "pilot light" system or "Night Watchman Light" system, controlled from the turbine room which will be for use not only during the non-operating hours of the plant but for emergency lighting in case something should happen to take the turbo generators off the system.

Provisions have been made for connection to an outside source of power, to provide current for maintainance purposes and necessary pumps during the non-operating hours when the turbines would be shut down, and boiler plant under repair.

Wiring in general will be in rigid metallic conduit, installed exposed on the ceilings, walls or under trusses, and in wet areas will be safe-guarded, so far is practicable, against corrosion. In these areas moisture resistant insulated wires will also be used as a further precaution against trouble developing inside the conduits. To reduce as much as possible work stoppages due to primary circuit failures, each circuit will be designed for two complete circuits in parallel, normally to operate continuously in parllel but each of sufficient capacity to carry the load without injurious heating.

Water Supply

Water for the process requirements in the mill is to be delivered through a 20-inch line at about 50 ft. head from the new filter plant now under construction by the Savannah Industrial and Domestic Water Supply System. Part of this water will be taken initially through the surface condenser of the turbine and then boosted to higher pressures for mill requirements. As this water will be potable, drinking facilities will be provided from the same source in an independent line.

To furnish water for fire protection, evaporator condenser, cleaning of wood, wash-ups, etc., where clean water is not necessarily required a separate pump house is to be built to take water from the Savannah River in which there will be two 1000 gpm fire pumps, one motor driven and one gasoline engine driven and two 5000 gpm pumps for the mill requirements.

Waste disposal for the mill will be carried off in two main trunk sewers to the Savannah River, liberal provision being made for general drainage of the area.

A 100,000-gallon elevated water tank is to be provided for the underground loop system of mains in conjunction with the fire pumps, to provide the necessary hose and sprinkler facilities of the mill.

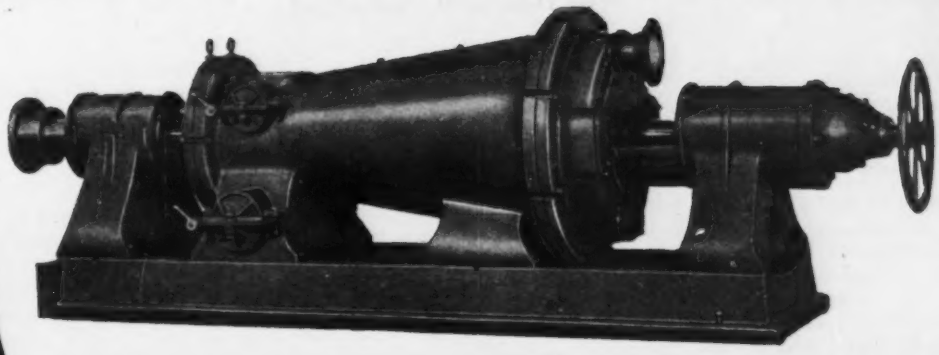
General Facilities

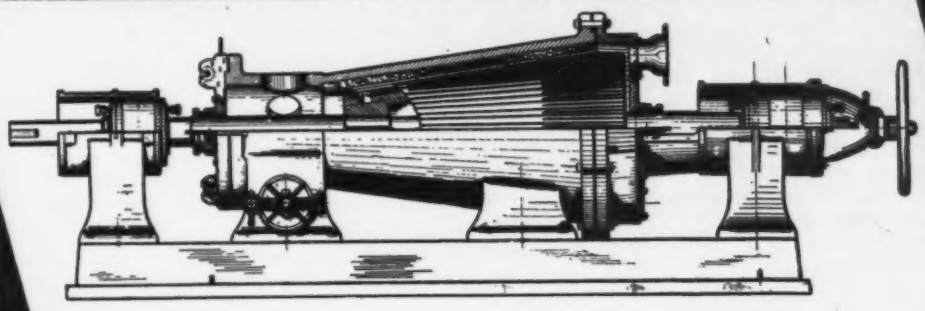
The main office building will contain some 10,000 square feet of floor area and is to be fully air conditioned and treated architecturally in the Williamsburg style. It is to be located on the north side of the property in conjunction with the first aid, clock house, and main entrance gates so that access to the front of the office can be obtained without going inside the fence, although access will be available to emsome 10,000 square feet offloor area ployees' to the inside from the rear. Liberal parking space for employees' cars, buses, etc., will be provided in the immediate area close to the office.

Liberal locker, wash, and rest rooms,

(Continued on page 94)

THE JONES JORDAN





The modern Jones Jordan embodies highly engineered improvements that provide extreme accuracy of vital parts, thrust mechanism, and also carefully applied filling design to meet specific mill requirements. The proper application of filling permits either effective cutting action, or positive, efficient DEFIBERING, FIBRILLATING, OR HYDRATING, as desired.

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Builders of Quality Machinery for Paper Mills

Continuous Beating & Refining

By Douglas M. Sutherland

The papermaker has since the beginning of the paper art attempted to achieve continuous operation. From the earliest days paper was made entirely by the batch method. With the advent of the cylinder and fourdrinier machine, the actual formation of the paper web became a continuous operation.

The development of continuous stock preparation equipment has not been as rapid as have other steps in paper manufacture. Even today a large number of mils are preparing their stock by batch methods. There has, however, been a noticeable increase in the number of mills changing to continuous operating methods for preparing their furnish.

The desire to obtain continuous stock preparation is brought about by two principal factors. These factors are:

1. Batch operations do not give the desired control of pulp necessary for high speed papermachine operation.
2. The operating and maintenance cost of a batch system is high compared to a modern continuous refining system.

Let us examine these two factors and see why the batch system does not fulfill all requirements of control suitable for high speed operation of modern paper machines.

The batch system is designed to do the bulk of the refining work in beaters or by recycling through refiners until a desired stock characteristic is reached or, in some cases, until the pulp has passed through the refining element so many times or so so many minutes.

The pulp is then passed through one or more jordans and on to the papermachine. The control here is basically with the jordans but this is not entirely true as too much or too little treatment by the beaters will adversely affect the jordan operation with resultant poor performance on the papermachine.

The finest control can only be obtained when the refining is done in a single pass operation in such a way that variation in pulp to the refiners can be adjusted for immediately and this adjustment reflects itself on the papermachine without loss of time or paper.

The second factor is excessive cost. In a modern mill continuous system savings will be reflected in:

1. Lower power per ton of paper.
2. Less floor space.
3. Lower labor cost.
4. More uniform papermachine operation.
5. More flexibility of operation.
6. Better control of paper quality.
7. Ease of control over refining.
8. Simplification of system with consequent savings in time, material and labor during washups.

The Sutherland refiner was specifically designed for continuous operation in a single pass. To achieve this the single rotation disc type refiner was selected because it offered inherent characteristics not found in other types of units. These characteristics are:

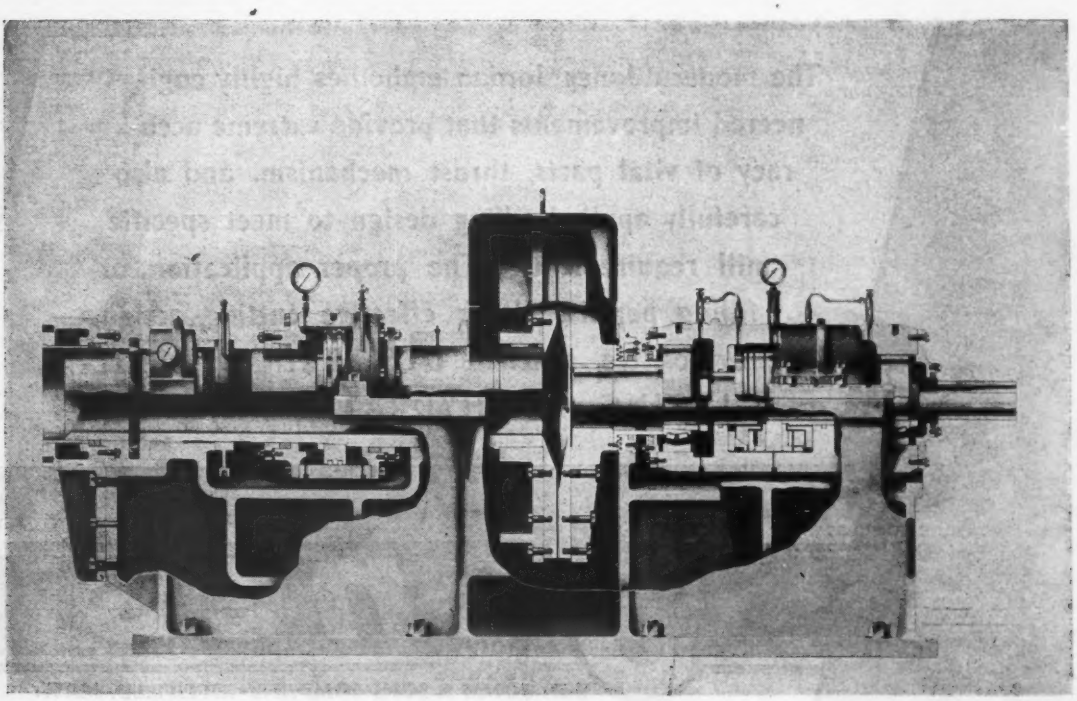
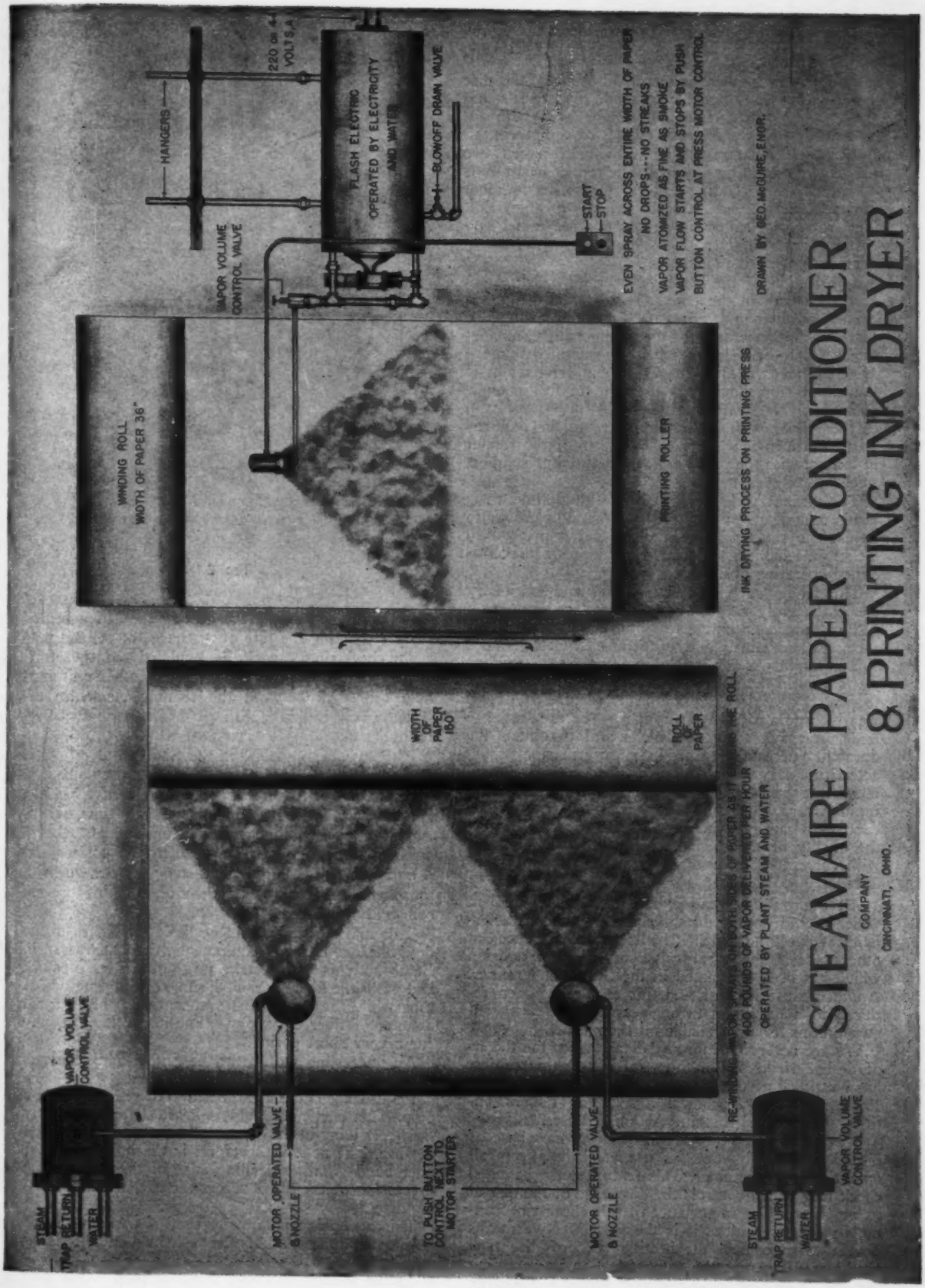


FIG. 1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& PRINTING INK DRYER
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EVEN SPRAY ACROSS ENTIRE WIDTH OF PAPER
NO DROPS.--NO STREAKS
VAPOR ATOMIZED AS FINE AS SMOKE
VAPOR FLOW STARTS AND STOPS BY PUSH
BUTTON CONTROL AT PRESS MOTOR CONTROL
OPERATED BY PLANT STEAM AND WATER
400 POUNDS OF VAPOR DELIVERED PER HOUR
WINDING ROLL
WIDTH OF PAPER 36"
PRINTING ROLLER
ROLL OF PAPER
WIDTH OF PAPER 150"
FLASH ELECTRIC
OPERATED BY ELECTRICITY
AND WATER
HANGERS
220 or 44 VOLTS, A.C.
BLOWOFF DRAIN VALVE
START
STOP
VAPOR VOLUME CONTROL VALVE
MOTOR OPERATED VALVE & NOZZLE
TO PUSH BUTTON CONTROL NEXT TO MOTOR STARTER
STEAM
TRAP
RETURN
WATER

1. Lower power consumption.
2. Efficient use of centrifugal force.
3. Extreme accuracy of the working faces.
4. High capacity.

In addition to these inherent advantages, the disc type machine is adaptable to modern materials and methods of construction and can be built with accuracies not practical in other types of equipment.

Upon examination of the Sutherland refiner, we find some interesting features. The refiner basically is composed of a rotating element, stationary element and a frame for holding the elements in alignment. The rotating element is equipped with radial and thrust bearings and a flexible coupling for direct connection to the drive motor.

Lubrication of the bearings is by oil drawn from a storage tank in the frame. It is passed through a cooler and filter under pressure into the bearings. To insure against operation of the refiner without an adequate supply of oil, a switch is incorporated into the system which will shut down the main drive motor if the oil system should fail to maintain five pounds' pressure in the bearings. It will also prevent startup of the refiner without first building up the required oil pressure in the bearings. All parts of the refiner in contact with the pulp are manufactured of stainless steel.

The stationary element consists of a pulp inlet tube, heads and disc equipped with a hydraulic piston to adjust the setting between discs and a mechanical locking mechanism to lock the refiner in a predetermined operating position.

The frame supports the rotating and stationary elements rigidly so that when the discs are brought together, they are accurate to within .001" across their face and maintain this accuracy at all times.

You might wonder at the large amount of stainless steels used in the refiner and the excessive care taken to protect against corrosion. This feature of design was incorporated into the refiner to secure long life under any operating conditions and to obtain the durability necessary to produce uniform stock characteristics. Day after day the refiner and all its elements must remain the same. Corrosion will introduce rapid wear which, although possibly not serious enough to cause replacement of the part, will affect the quality of the stock being produced by the unit with corresponding change in quality of paper produced.

All of you have had experience with equipment which would not produce the same stock characteristics at one time which it had formerly produced at other times. One great cause of this is corrosion which has been eliminated in the Sutherland refiner. Another cause is wear and this factor has been reduced to a minimum through use of the best construction materials available on the market.

We are not going into any details as to the theory of design of discs. For those interested, this subject has been well covered in an article published on page 192 of the 1937 Technical Association Papers, entitled "Design and Refining Action of Discs."

It is important, however, to mention one phase of disc design at this time as it materially affects all operations of the refiner. This feature is the patented check ring which controls the discharge of the disc at its periphery. The importance of this check ring cannot be overstressed as it is the first effective means developed to control the beating time of disc type machines. It serves the same function as retarding the flow of stock in a jordan by closing the discharge valve or by controlling the beating time of a beater.

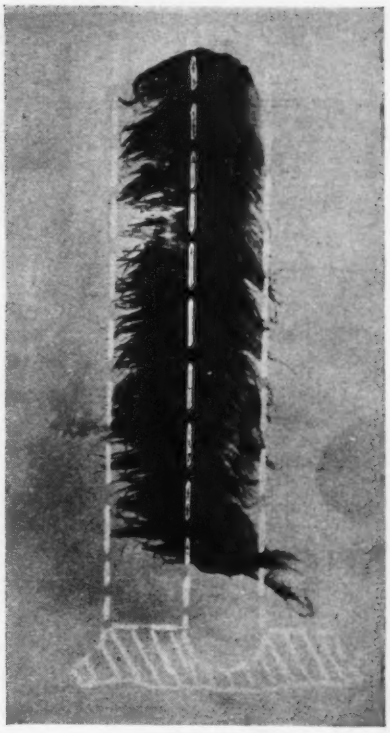

FIG. 2

By regulating the rate of discharge of refined pulp at the check ring, capacity is regulated and, therefore beating time. The disc refiner like any other unit must hold the stock between the refining elements sufficiently long to accomplish the desired amount of refining.

Although beating time in the Sutherland refiner is measured in fractions of a second, it must be kept in mind that all of this time is spent in effective beating. Another way of visualizing the beating time of this refiner is to look upon it as a unit which takes a small quantity of stock, seven to fifteen pounds, depending on disc design, consistency, etc.; works it thoroughly; discharges it; then repeats this process over and over again.

This may be said to be the basic difference in the design of continuous equipment over batch system. Batch systems usually take large quantities of stock and work the fibers spasmodically for long periods of time while the continuous system takes only a small amount of fiber at any one time and retains it only for a very short period.

An interesting feature of the Sutherland refiner is how it accomplishes work on pulp fiber.

Plate No. 2 illustrates the action of refiner discs on pulp. This particular pulp is kraft. It shows clearly the fibers lying in the groove and the mat of fibers on the bar. The action, therefore, is the building up of fiber bundles on the leading edge of the bar and the processing of the fibers across the bars of the opposing discs.

This action is similar with that of other pieces of refining equipment and is the basic method of refining pulp today.

As the method of doing work on pulp is basically

Words and Pictures
for the Young Mill Man

from E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Wilmington 98, Delaware

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CONTROLS SLIME—PRESERVES PULP

the same as other types of refining equipment, it might well be asked what makes the Sutherland refiner particularly adaptable to single pass operation and what permits it to control pulps so accurately for the papermachine.

Single pass operation is always possible when the proper combination of bar passes or impacts is available per pound of stock in a refiner.

The centrifugal forces generated by a large disc rotating at relatively slow speeds—an example is a Sutherland 42" refiner rotating at 450 RPM—are extremely high and very little power is expended in moving the stock across the face of the disc.

This high centrifugal force permits design of disc with a high ratio of bar to groove area which results in an extremely high number of bar passes per pound of stock. This plus the action of the check ring retaining the stock in the disc for the desired beating time permits the Sutherland refiner to accomplish any desired reduction in particle size in a single pass.

For the finest control of stock quality coming from the papermachine, it is necessary that the refining equipment be installed as close as possible to the papermachine and that it be of such a design that minor changes can be quickly made to the refiners and reflect immediately on the papermachine with the proper quality.

To accomplish this ideal type of control, the Sutherland refiner has two methods of controlling stock quality. The first method is to adjust the setting between the discs. When this setting is made, the refiner is locked in place so the relationship between rotating and stationary elements is fixed mechanically. For additional minor adjustments, the stock inlet pressure is regulated by opening or closing a pressure regulating valve on the stock inlet line. Changes in pressure affect the beating time of the pulp, thereby changing characteristics of the stock going to the papermachine.

The controls on the refiner give the operator the ability to exactly regulate the stock to fit the papermachine requirements. The next step is to install the refiner close to the papermachine so changes of stock quality will show on the papermachine without loss of time or paper. This may be accomplished in several ways. One method which has been proven very successful is illustrated in Fig. 3.

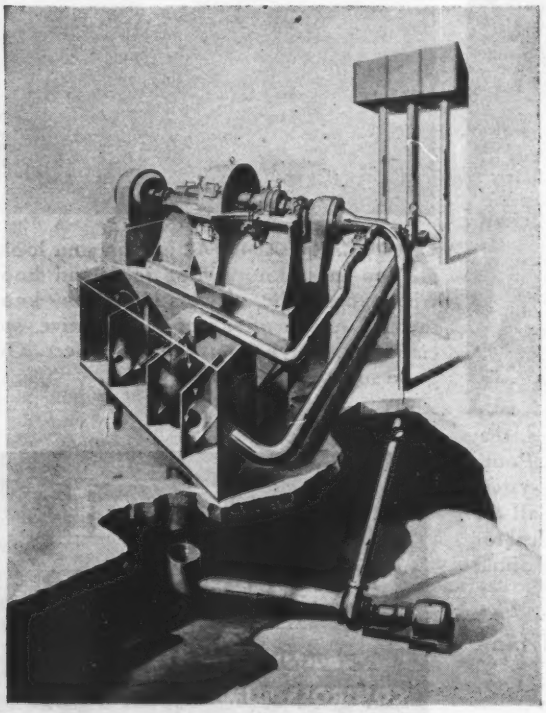

FIG. 3

In this installation the refiner is installed between the regulator box and the fan pump. Stock from the machine chest is pumped to the regulator for control of paper weight. It then flows by gravity to the refiner control box. Flowing over a baffle in the box, it drops to the refiner supply pump which furnishes stock to the refiner.

Excess pressure to the refiner is regulated and the stock from this line is returned to the refiner supply side of the control box. Stock passing through the refiner returns to the bov and overflows a baffle to the refiner supply side but, as the refiner control box fills, stock flows to the line supplying the fan pump. When the system is completely filled with stock, the amount coming from the regulator box is always equal to the amount flowing to the fan pump.

With this system any change of refiner setting will immediately show in the papermachine. Notice that there is always some refined stock being recirculated. This is necessary to maintain a constant head on the fan pump.

There are innumerable methods of installing refiners. Another system now in use is:

Base refining of stocks prior to blending. In this method each separate stock is partially refined, blended and then put through another Sutherland directly behind the papermachine.

Two typical installations of Sutherland refiners will show the following results:

Example No. 1 is an installation of one refiner doing all the preparation for a papermachine making book, bond and writing grades. Since the refiner was installed there has been approximately 40% reduction of power. The mill reports the following changes in the quality of paper made on this papermachine—greater retention of filler, high density with a marked increase in fold. Other characteristics remain essentially the same as with their previous conventional stock preparation system. In this case beaters and jordans were replaced.

Example No. 2 is an installation operating on a wide variety of grades including book, bond, bristol, high density label, music and offset papers with the refiners replacing beaters and jordans. One jordan is installed as a tickler. The savings in power are approximately 35% to 40%. The mill reports improvement in formation, fold and retention without loss of the other desirable qualities.

As Sutherlands operate on wide varieties of furnish ranging from 100% kraft to 90% hardwoods with and without fillers, no attempt has been made to give specific performance figures on any particular grades. However, the operation of Sutherland refiners in a continuous refining system may conservatively be expected to accomplish the following results:

1. Reduce power an average of 50%.
2. Reduce floor space.
3. Reduce labor cost.
4. Increase filler retention.
5. Improve formation.
6. Increase fold.
7. Give the finest possible control of stock to the papermachine.

All the above without any loss of other sheet characteristics not specifically mentioned.

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Tests by paper board manufacturers prove that Stein Hall 455 Calender Gum produces superior surfaces at lower cost. Paper treated with 455 Calender Gum repels ink, oil, waxes. It produces a surface which assures high gloss and brilliant color printing.

These tests also prove the ease of application of 455 Calender Gum . . . prove that it assures freedom from foaming, picking and sticking.

Backed by Stein-Hall's years of experience and reputation for high-quality products for the paper industry, 455 Calender Gum is now freely available to manufacturers of quality printing board.

Test it yourself to prove its stability and superiority as a surface sizing agent. Our technicians will be glad to assist you in any tests you make. Write us for full information.

80 YEARS OF SERVICE TO THE PAPER INDUSTRY

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EST. 1866

LABORATORIES AT NEW YORK, CHARLOTTE, N. C., PROVIDENCE, R. I., CHICAGO

MEET A SOURCE OF ANSWERS TO YOUR MACHINERY PROBLEMS

FARREL PAPER MILL MACHINERY

ROLLS: Chilled Iron, Dry Sand, Meehanite, Alloy Iron, Steel, Chromium Plated
FOR: Calender Stacks
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Glassine Calenders
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Breaker Rolls
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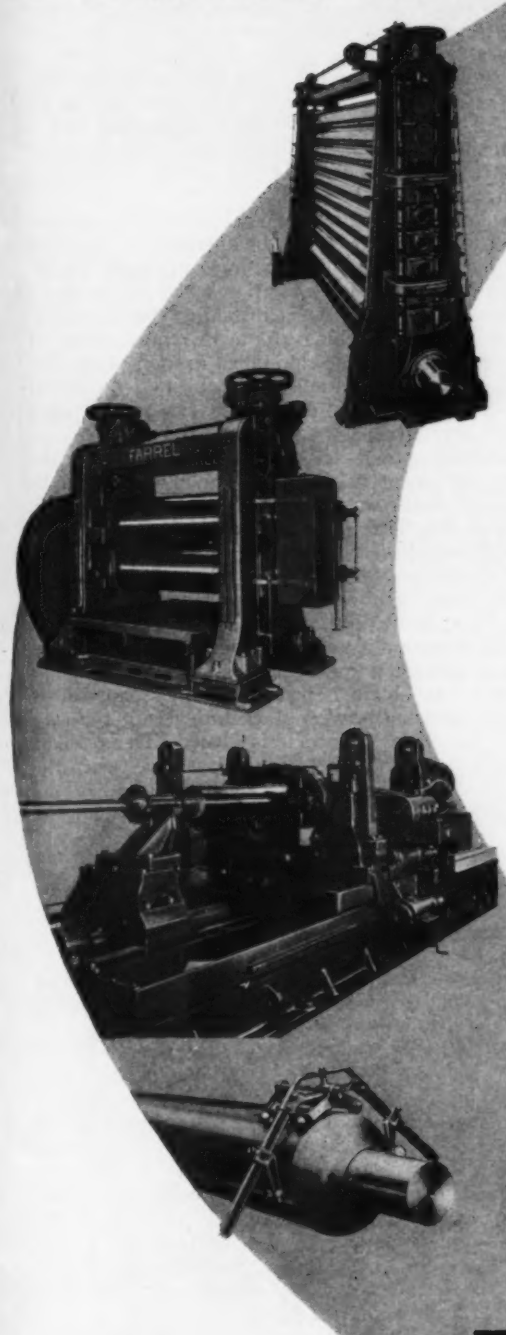
Coating Rolls
Creping Rolls
Plater Rolls
Cutting Rolls
Paraffining and Waxing Rolls
Saturating Rolls
Silicating Rolls
Miscellaneous Special Purposes
CALENDERS: Paper and Board
GRINDING MACHINES: Roll
CALIPERS: Roll
GEARS, CUT: Spur, Single and Double Helical (Farrel-Sykes Continuous Tooth Type)
SPEED REDUCING GEAR UNITS
SPEED INCREASING GEAR UNITS
FLEXIBLE COUPLINGS



Do you think of Farrel simply as the maker of high precision, long-lived calender rolls? If you do, this complete list of Farrel equipment for paper makers may open a new source of answers to many of your machinery problems.

Look it over, and the next time you need a *designed-for-the-job* calender, a precision roll grinder, a caliper for checking the accuracy of your rolls, a quiet and efficient speed reducer, or any of the other equipment listed above, call Farrel. Complete information and engineering help will be supplied promptly, without obligation. FB-324

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: **Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.**
Sales Offices: **Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston, Charlotte**

Farrel-Birmingham

Coating on a Paper Machine

By Frank W. Egan

Paper Converting Consultant, Bound Brook, N. J.

Once again we are back in the field of competition, that is, if we can obtain the needed raw materials out of which we make paper. It is true that the competition at the moment is not too keen, but it will be when we get caught up.

In the advertising field there is competition and plenty of it. The radio, magazine and newspaper companies are trying to obtain the largest share of the advertiser's market. Radio is putting forth a great effort to hold the buyer's ear by lulling him with interesting playlets, music, comedians and news items. A listener becomes vulnerable as soon as he turns on the radio.

To offset this, magazine and newspaper publishers are improving their periodicals and newspapers by printing interesting and educating articles, pictures and news items as attractions for the benefit of their advertisers. In addition the advertising companies are making up attractive advertising material, using historical, medicinal and other forms to get the buyer's eye. An advertisement must have eye appeal and that means that the printed paper must have a surface that does not tire the optic nerve. If the paper is coated with tinted clay and it reflects blue or green rays, the eye will be relaxed and reading will be a pleasure. There is nothing that I know of that is more pleasing to the eye than a view of an expansive green lawn or a blue sea. If we take a page from the book of nature we cannot go wrong. The finish of the coated paper should not be too high, for gloss, or light reflectance is disturbing to the reader. A mat finish produces the best reading surface, but it also presents the poorest printing surface. It is necessary that the paper have a smooth printing surface so as to obtain all of the fine detail of good printing, but the surface should not be glossy. A medium finish will serve and produce the best coated paper.

In forming a paper web at high speed there is a tendency to produce high and low areas that can be filled to a certain degree with clay.

In former years paper webs were coated in a separate operation. From ten to sixteen pounds of clay coating per ream were applied to both sides of the web and the product was used for books and magazines.

A mineral such as clay is receptive to ink and its solvent, much more so than cellulose.

It is true that a clay coating of ten to sixteen pounds cannot be applied to a paper web while it is being dried on a paper machine, chiefly because of the drying load and the offset of the clay coating onto the paper machine driers. But a five- to six-pound clay coat can be applied successfully on a paper machine and this coating will serve as an excellent base, with proper calendering, for printing.

To combat the competition with radio advertising all magazines and newspapers will be printed on clay coated paper. Newspapers will be printed in three or four colors to attract the buyer's eye. The magazines have led the way to multicolor printing and it is natural for the newspapers to follow.

Clay costs less than pulp, thereby reducing the cost of the paper. Coating in a paper machine group is low in operating cost.

The coating equipment used in a paper machine group is rugged in construction, being similar in design to standard paper machines. A printing unit is used to apply the coating. The equipment is devoid of refined adjustments and yet the setting attachments are micrometric.

The equipment can be threaded in the same manner as the paper machine. It can be operated by a regular paper machine crew. The coating equipment swings back out of print coating position when not in use.

It is a poor policy, when installing coating equipment in a paper machine group, to remove some of the dryers and place the equipment in their place. The coating equipment will add to the drying load and if dryers are removed the drying capacity of the paper machine is reduced.

Some mill owners have considered installing the coating equipment in the basement. That should be avoided chiefly because it requires that the crew work on two floors. The equipment, even though it operates with very little supervision, should be under the eye of the crew at all times. Installing the equipment overhead interferes with the paper machine hood and the traveling crane. The proper thing to do is to move back the winder and calender even though it means adding an extension to the building.

In order to obtain a properly coated paper it is necessary to use a breaker stack to level off the surface of the paper before it is coated. The breaker stack should be installed after the last dryer, then the first coating machine followed by the dryers for the first coat, then the second coating machine and the dryers for the second coat, finally the calender and winder.

The calender in the paper machine group will level off the surface of the paper after it is coated and impart a semifinish. The proper calendering however, is done on the super stack.

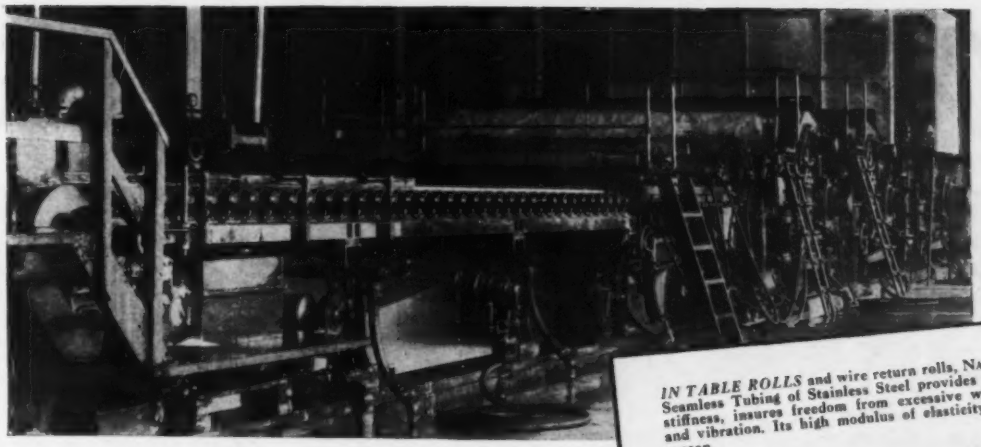
Short felts should be used on the paper machine so as to prevent streaking or draw wrinkles, and felt dryers are required.

The coating is applied to the paper web when it contains 15% to 18% moisture. If the paper is too dry the bond between the paper and coating is not what it should be and the coating may pick on the printing press. If the paper is too moist the coating will not lie on the surface as it should.

Casein cannot be used as an adhesive in the coating when applied in a paper machine group, due to its superior adhesive quality, for it will adhere to the dryers as well as to the surface of the paper. Starch is used as the adhesive. Soybean products are also used as the bonding agent.

If the proper drying arrangement is provided, there is no reason why paper cannot be coated in a paper machine group at speeds of 1000 to 1500 feet per minute.

The coating holding tanks and mixing equipment



IN TABLE ROLLS and wire return rolls, NATIONAL Seamless Tubing of Stainless Steel provides greater stiffness, insures freedom from excessive whipping and vibration. Its high modulus of elasticity is the reason.

If it's a tubing problem put it up to NATIONAL

TODAY there is one headquarters — one central source for the finest in steel tubing — to which you can turn for the practical and economical solution of any problem involving better equipment performance through better pipe and tubing. That headquarters is NATIONAL TUBE—the world's largest producer of tubular steel products.

When you call in a NATIONAL Tubing Specialist he is thoroughly competent to analyze your needs and difficulties. His purpose is not to "sell" you any particular type of tubing in preference to any other, but to give you expert engineering advice in the selection of the right tubing that will insure you the most satisfaction and that will save money for you.

He represents an organization that has been the leading authority on all forms of steel pipe and tubing for more than half a century. Because he can offer you steel tubes in every analysis — from low carbon to the finest alloy and stainless steels—and in the widest range of size and wall thickness, you can be sure that his recommendations are totally unbiased.

If your tubing applications involve unusually severe conditions or even if they appear quite simple it will pay you to get authoritative advice on tubing selection and use. There's no better way to keep tubing costs down, and to lengthen life between replacements.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Tubing Specialties Division

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

NATIONAL TUBE COMPANY · USS STEEL · UNITED STATES STEEL

UNITED STATES STEEL

What MAKES IT DIFFERENT?

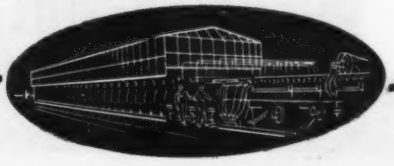
TODAY, just castings--tomorrow, part of a dryer section of a paper machine. They will be carefully machined, checked and assembled on our floor. Every endeavor is made to produce perfect equipment.

There's a pride of workmanship found in every man employed in the Bagley & Sewall organization--no matter what part he may play. This principle of accuracy in production has earned for this century-old concern an enviable position in the paper making industry.

The Bagley & Sewall Company stands foremost in engineering survey and development. Our sales engineers are available for discussion of any problem.

BAGLEY & SEWALL

WATERTOWN, NEW YORK



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RCI

paper is better . . .

WET OR DRY

WITH

P-426 BECKAMINE

Exceptional stability keynotes the many advantages of this highly favored urea-formaldehyde resin, developed especially for the paper industry. P-426 Beckamine is a marvel at increasing wet strength, and it adds substantially to tensile strength, fold and Mullen as well. Apply it at any stage of processing—in beater, fan pump, head box or directly to the sheet at the size press —the result is superior paper for every purpose. For additional information write direct to the Sales Department at Detroit.

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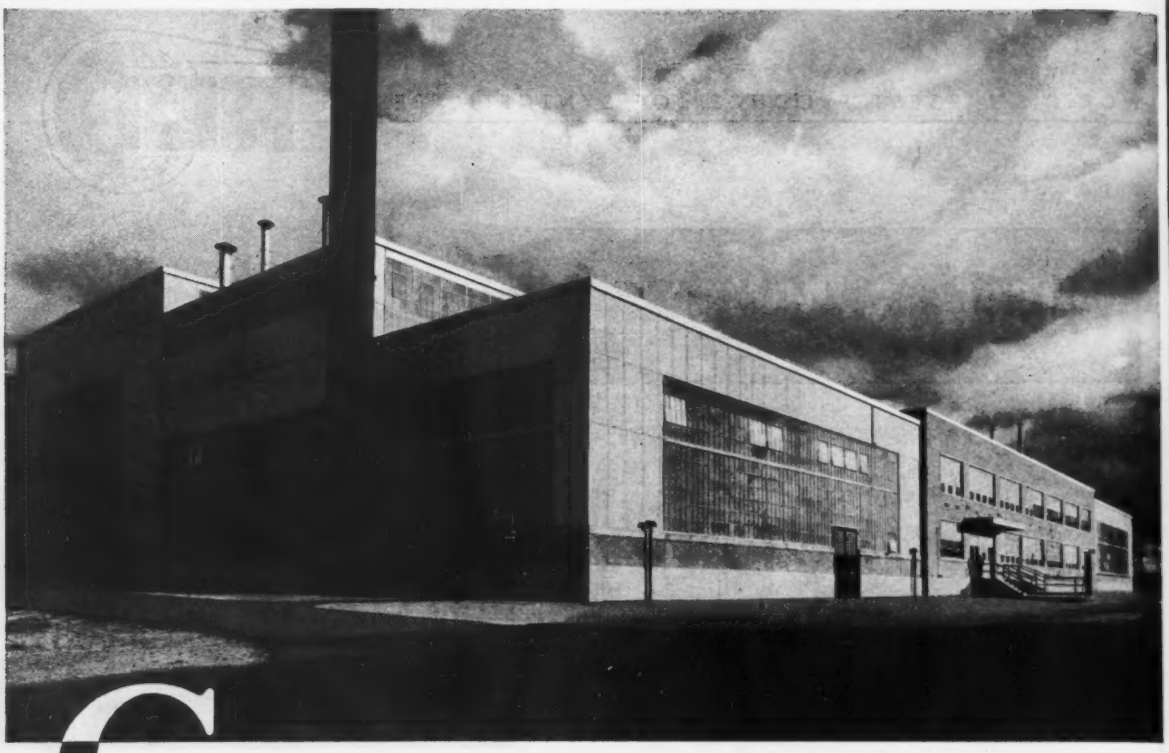
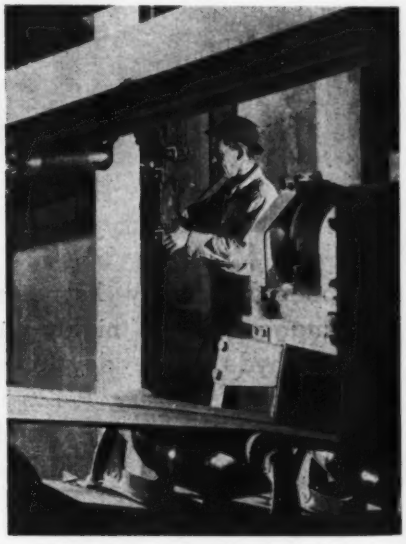


GIVING DUST THE BRUSH-OFF

Result: . . . better working conditions

Heat and dust from top charging furnaces are drawn off at source, instead of being disseminated throughout the steel foundry of the Chapman Valve Manufacturing Company at Indian Orchard, Massachusetts.

The complete plant . . . offices, health clinic, laboratory and production facilities . . . was designed and built by Stone & Webster Engineering Corporation in 11 months from date of authorization.



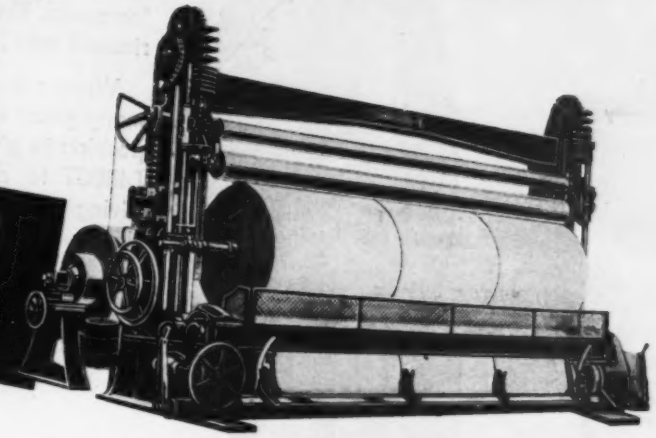
STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY OF STONE & WEBSTER, INC.

Faster production of Better Rolls

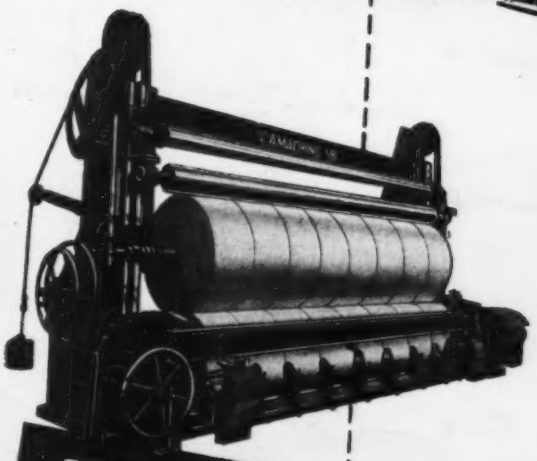
CAMACHINE 20

For newsprint, book and kraft. Web widths 180" to 310". Speeds up to 3000 fpm.



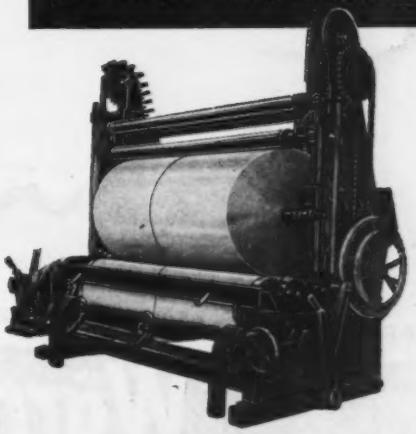
CAMACHINE 19

For newsprint, book and kraft. Web widths 118" to 192". Speeds up to 2800 fpm.



CAMACHINE 14

For paper and paperboard. Web widths 53" to 90". Speeds up to 1400 fpm on paper, 800 fpm on board. Also widely used as rewinder in finishing rooms and converting plants.



CAMACHINE 18

For paper and paperboard. Web widths 73" to 162" on paper, 73" to 142" on board. Speeds up to 2000 fpm on paper, 1200 fpm on board.

WRITE FOR LITERATURE

CAMERON MACHINE COMPANY . 61 POPLAR STREET BROOKLYN 2, N. Y.

PUMPING *Service* TO YOU

on a Nation-wide Basis

Alert to the fact that engineers the country over are anxious to modernize their pumping equipment as soon as possible, Warren is making an all-out effort to cooperate.

Our engineering and manufacturing facilities have been enlarged . . . our nation-wide network of agencies increased. These agencies are staffed by trained, experienced men . . . ready to give you on-the-spot service.

Warren engineers are pump specialists, having spent many years in this field exclusively, and they are in a position to give you expert, cooperative advice. WRITE DIRECT to our home office, Warren, Massachusetts, giving all possible information as to operating conditions and desired results.

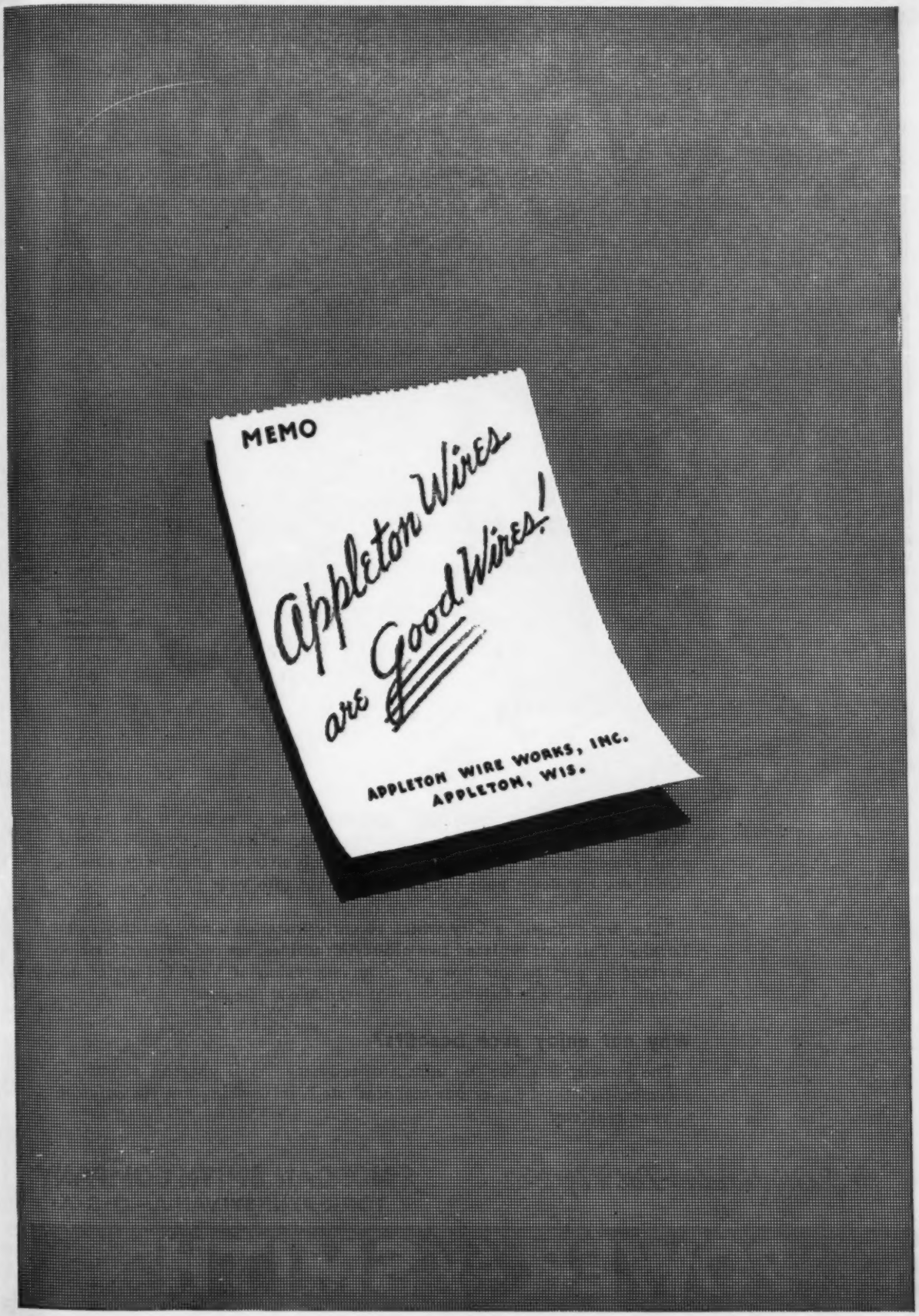
P-6

WARREN STEAM PUMP COMPANY, INC. • WARREN, MASSACHUSETTS

Warren Pumps

CENTRIFUGAL AND RECIPROCATING

For: Power Plants — Chemical Plants — Paper Mills — Food Industries — Metal Working — Oil and Mining Services


MEMO
Appleton Wires are Good Wires!
APPLETON WIRE WORKS, INC.
APPLETON, WIS.

Get More Production *out of* WATER POWER

WHY put up with inefficient equipment, that gives only mediocre performance, when you can improve power efficiency by modernizing your present plant? Why continue to let obsolete, or poorly-functioning machinery cut down your production and eat into your profits?

Take, for example, a City which recently installed a new Smith-Kaplan Turbine. This unit replaced *two* old-style turbines, retired a Diesel Station to stand-by service, and brought about expansion of local industries, resulting from increased electric current available at low cost.

Why not enjoy such benefits?

The present demands the utmost of industry. Avail yourself of our experience, and the help of our technical staff, in working out the *solution to your problem!*

If It's Hydraulics—Put It Up to Us.

S·MORGAN SMITH COMPANY
YORK·PENNSYLVANIA~U·S·A·

POWER *by* SMITH

UR 100TH YEAR

1846

1946

Perkins-Goodwin Co.

ESTABLISHED 1846

30 ROCKEFELLER PLAZA • NEW YORK.

CHICAGO, ILLINOIS

LUFKIN, TEXAS

STOCKHOLM, SWEDEN

PULP AND PAPER

are generally located in the basement directly beneath the coating machine. The coating is recirculated, being filtered to remove paper fibers that are picked up from the applying rolls and passed on by the print roll doctors.

The solid content in the coating ranges from 50% to 70% depending upon the kind of liquid flow agent used. Naturally the higher the solid content the lower the drying load and the greater the speed.

An important factor in the drying of coated paper is the elimination of cockles. This is accomplished by not leaving the coated paper on the surface of the heated dryer for too long a period.

As time goes on and coating on a paper machine becomes a regular practice, changes in the design of the paper machine will take place. The changes will include dryers with smoother faces, chromium coated dryers, burnishing attachments, spider drums, roll arches, air drying systems and individual roll drives.

There is a well known saying that we cannot exist without paper. If that is so, the Paper Industry has received a challenge from the Radio Industry to improve the printing quality of the paper that is used in the magazine, book and newspaper fields, so that they can enjoy a good share of the advertiser's market.

Southern Paperboard Builds at Savannah

(Continued from page 74)

will be provided at strategic points within the mill, as are air conditioned offices for the mill supervisory forces.

General

The Southern Paperboard Corporation is a subsidary of Robert Gair Company, Inc., with George E. Dyke, President of the latter as Chairman of the Board; Ernest Rossiter, President; T. Raymond Pierce, Vice-President; T. W. Earle, Vice-President; E. O. Sommer, Comptroller; E. Meyer, Treasurer; W. F. Howell, Secretary; William Bergman, Assistant Comptroller; A. J. Bauser, Assistant Treasurer; and R. B. Trotman, Assistant Secretary.

Mr. Ernest Rossiter as President of the Company has been active for many months in the development of the project, the negotiations required in selecting a site and arranging for construction of the mill, and is now completing a working organization for its operation.

The procurement of wood and management of the woodlands acquired for Southern Paperboard's operations will be handled by another subsidiary, Gair Woodlands Corporation, under the direction of T. W. Earle, President.

Mr. Roland Wilber has been retained as Manager of Manufacturing; H. W. Borman as Assistant to the President; and Charles Mason as Personnel Manager for the Port Wentworth mill, the full organization for which is still in the formulative stage.

The general contract for the construction of the mill has been awarded to the Daniel Construction Company of Greenville, South Carolina. Representing this company on the ground will be James Rice, as Project Manager.

Sub-contracts have been awarded to Raymond Concrete Pile Company; Midwest Piping Company; and the Rollison Engineering Company (electrical sub-contract).

J. E. Sirrine & Company, Engineers of Greenville, South Carolina, and its various departments have been responsible from the inception of the project for the preparation of all reports, selection of equipment, design and detailing of final plans, under the direction of D. G. Moon, head of the Pulp and Paper Mill Division, with the supervision of the active construction in charge of J. W. Cantrell as Resident Engineer.

The estimated cost of the mill exclusive of the cost of the mill site, woodlands and inventory materials, is eleven million dollars.

Chippers—D. J. Murray Manufacturing Co.

Ro-Chippers — Waterville Iron Works.

Chip Screen — Allis-Chalmers Mfg. Company.

Hog for Refuse — Diamond Iron Works, Inc.

Knife Grinder — Bridgeport Safety Emery Wheel Co.

Locomotive Crane—Ohio Locomotive Crane Company.

Truck Crane (Link-Belt)—Bell Lott Road Machinery Company.

Digesters—Chicago Bridge & Iron Company.

Blow Valves—Yarnall-Waring Company.

Blow and Storage Tanks — Ingalls Iron Works.

Black Liquor Washers, Thickeners, Foam Breakers, Knotters, Centrifugal Screens, Agitators — Improved Paper Machinery Corporation.

Elevators — Monarch Elevator & Machinery Co.

Knot Grinders—Noble & Wood Machine Company.

Screenings Refiner — Sprout, Waldron & Company.

Speed Reducers—The Falk Corporation.

Liquid Alum Tanks—O. G. Kelley & Company.

Jordans—E. D. Jones & Sons Company.

Broke Beater — Shartle Bros. Machine Company.

Consistency Regulators — DeZurik Shower Company.

Paper Machine—Pusey & Jones Corporation.

Paper Machine Drive — General Electric Company.

Hoods and Fans—J. O. Ross Engineering Corporation.

Vacuum Pumps—Nash Engineering Company.

Condensate Return System — Midwest-Fulton Machine Company.

Fan Pumps — Ingersoll-Rand Company.

Stock, Liquor, and Water Pumps — Ingersoll-Rand Company, Worthington Pump & Mach. Corporation; Morris Machine Works, The LaBour Company, Inc.

Felt Conditioning — Bird Machine Company.

Scales—Fairbanks, Morse & Company.

Rewinder—Cameron Machine Company.

Roll Grinder—Lobdell Company.

Cranes — Northern Engineering Works, Manning, Maxwell & Moore.

Evaporators — General American Process Equipment Co.

Recovery Boilers, Refuse Boilers, and Oil Burning Boiers — Combustion Engineering Company.

Bark Stoker & Bin — The Hofft Company, Inc.

Precipitators — Research Corporation.

Salt Cake and Lime Handling Equipment — The Brady Conveyors Corp.

Causticizing System — The Dorr Company.

Lime Kiln—Traylor Engineering & Mfg. Company.

Alum Pumps—Wilfley Pump Company.

Soap Pumps — Viking Pump Co.

Stack — Alphons Custodis Chimney Const. Co.

Feed Water Pumps—Goulds Pumps, Inc.

Feed Water Heater — Elliott Company.

Mill Compressors — Sullivan Machinery Company.

Recovery "Puff System" Compressors — Worthington Pump & Mach. Corp.

Fire Pumps—Worthington Pump & Mach. Corp.

Water Intake Screen — Link-Belt Company.

Steam Turbines, Condenser, Motors and Controls — Westinghouse Electric Corporation.

Main Switchgear and Transformers —General Electric Company.

Elevated Water Tank — Chicago Bridge & Iron Company.

Piping — Midwest Piping & Supply Company.

Structural Steel — Ingalls Iron Works.

Conveyor Belting — B. F. Goodrich

Refractories—Harbison-Walker.

Roll Covering—U. S. Rubber Co.

Steel Sheet Piling—Tennessee Coal, Iron & Ry. Co.

Sash—Detroit Steel Products Co.

Paint—Earl Paint Company.

Reinforcing—Hall Steel Company.

Cement—Atlas Portland Cement Co.

Roofing, Tile — Poreto Manufacturing Co.

Fencing—Cyclone Fence Company.

Sandy Hill-SPENCER DANDY ROLL DRIVE

Increased Sharpness of Watermark

This drive was developed primarily for controlling dandy speed compared with the speed of the wire resulting in a far superior watermark in clarity of outline. However, it also improved the sheet so that the machine could be speeded up twenty-five percent on equal quality.

THE unit as manufactured by Sandy Hill is covered by patents both in the United States and Canada. An important feature of this design is that weighting of one side more than another is completely eliminated. The drive shafting will permit the Dandy Roll to follow any slight oscillation of the wire from side to side.

Better Formation at Higher Speeds

The Sandy Hill-Spencer Dandy Roll Drive facilitates fibre formation and closing, enhancing the finish of the sheet. It gives more even distribution in laying the sheet and perfect control for "localizing."

THE SANDY HILL IRON & BRASS WORKS
HUDSON FALLS, N. Y.

Lubrication of Logging and Sawmill Machinery

By A. F. Brewer, Techinical and Research Division
The Texas Company, New York

"Timber," or as the colorful woodsman says—"Timbah"—is more than just a routine warning today, that a giant Douglas Fir is about to be felled where the Faller wants it to fall. "Timber" means building lumber, trim for the finished home, woodpulp for the paper mill. Timber is one of the most vital raw materials in the postwar reconstruction plan. The popular idea used to be that timber is a product of the Pacific Northwest and the States along the Canadian border. It still is, but the South today has made a definite bid as a competitive area, especially since the fast growing slash pine has been developed and proved to be applicable as wood pulp for the Southern paper mills. Southern pine also makes excellent building lumber.

The Necessary Machinery

From forest to mill, the essential machinery includes—

—power saws
—yarder donkeys
—loaders
—shay engines
—locomotives
—tilting racks
—tractors
—log cars
—trucks and trailers

When the logs are delivered to the sawmill and the rough timbers to the planing mill, the following machines are used:—

—log carriages
—"shotguns"
—steam niggers
—kickers
—manipulators
—side rollers
—run-out tables
—band and circular saws
—resaws
—set works
—edgers
—gang saws
—trimmers
—slashers
—"hogs"
—lathes
—surfacers
—moulders
—planers
—moulders and conveyors
—reduction gears
—steam engines
—saw filing machines
—air compressors

All this machinery requires synchronized operation; failure of any part to function effectually may react upon the production schedule. So logging and sawmill machinery is carefully maintained. Effective operation is further assured by reason of the fact that modern machinery is equipped with carefully designed bearings, gears and chains. Lubrication is a feature of the maintenance program.

When lubricants are selected according to their lubricating ability, when the operating conditions are considered, when the machines are regularly lubricated, maximum production is assured at minimum cost for maintenance. Among the most important factors in connection with lubrication in these industries, are the speed and accuracy of the work. Logs are sawed at almost unbelievable speed, with remarkable accuracy as to dimensions. These requirements had much to do with improvement in the design of sawmill machinery. The conveyor builder also played a part; his mechanisms feed the logs not only to the saws, but remove the timbers, boards or trim as fast as they are finished.

Portable Power Saws

Portable saws may be built with an endless saw tooth chain or a circular cutting element.

The Chain Saw

In a portable chain saw the cutting element is held in cutting position by a guide bar, with the driving unit at one end and the tail-stock at the other. The modern chain saw used in the woods can be powered by either a two-cycle gasoline engine or an electric motor. Power transmission is attained by suitable reduction gearing.

Lubrication of the chain saw is very important; as this device in modern heavy logging operations is a key machine it must be kept running. This requires careful attention to oiling the chain which is done from a reservoir in the tailstock; protecting the power transmission gearing with a suitable gear lubricant; and lubricating the power unit according to type and manufacturers' recommendations. Other parts which may be carried on ball bearings require a special anti-friction bearing grease.

Chain lubrication is especially important, for if it is not properly maintained, the unit cannot be run at full power. An automatic oiling idler serves this purpose, taking oil from a built-in reservoir. The viscosity of oil required for the saw chain depends upon the operating temperature—it may range from SAE 20 to 50.

The gasoline engine being of the two-cycle type requires that oil be mixed with the gasoline. Mixing should be done in a separate container so that a uniform solution is developed. Good practice avoids using the fuel tank for this purpose. A half pint of oil (SAE 30 to 50 according to climate) per gallon of gasoline (unleaded) is customary.

The Portable One Man Power Saw

This type of saw is used primarily for pulpwood and firewood cutting where one man operation is advantageous. This device also is powered by a gasoline engine; in contrast, however, the 4-cycle type is used wherein lubrication is similar to that in a conventional automotive engine.

The engine drives the saw through a connecting shaft and set of hardened steel driving gears. Lubrication of these latter requires a heavy duty grease compounded with an oil of comparatively heavy body so that leakage will be effectually resisted.

Handling the Logs

Power is a factor throughout the industry. Manpower for saw control when the trees are topped and cut. Steam, gasoline engine, Diesel, and to some

To mills operating

SUPER STACKS

consider

- your original investment in each stack
- the per hour cost charged against each stack
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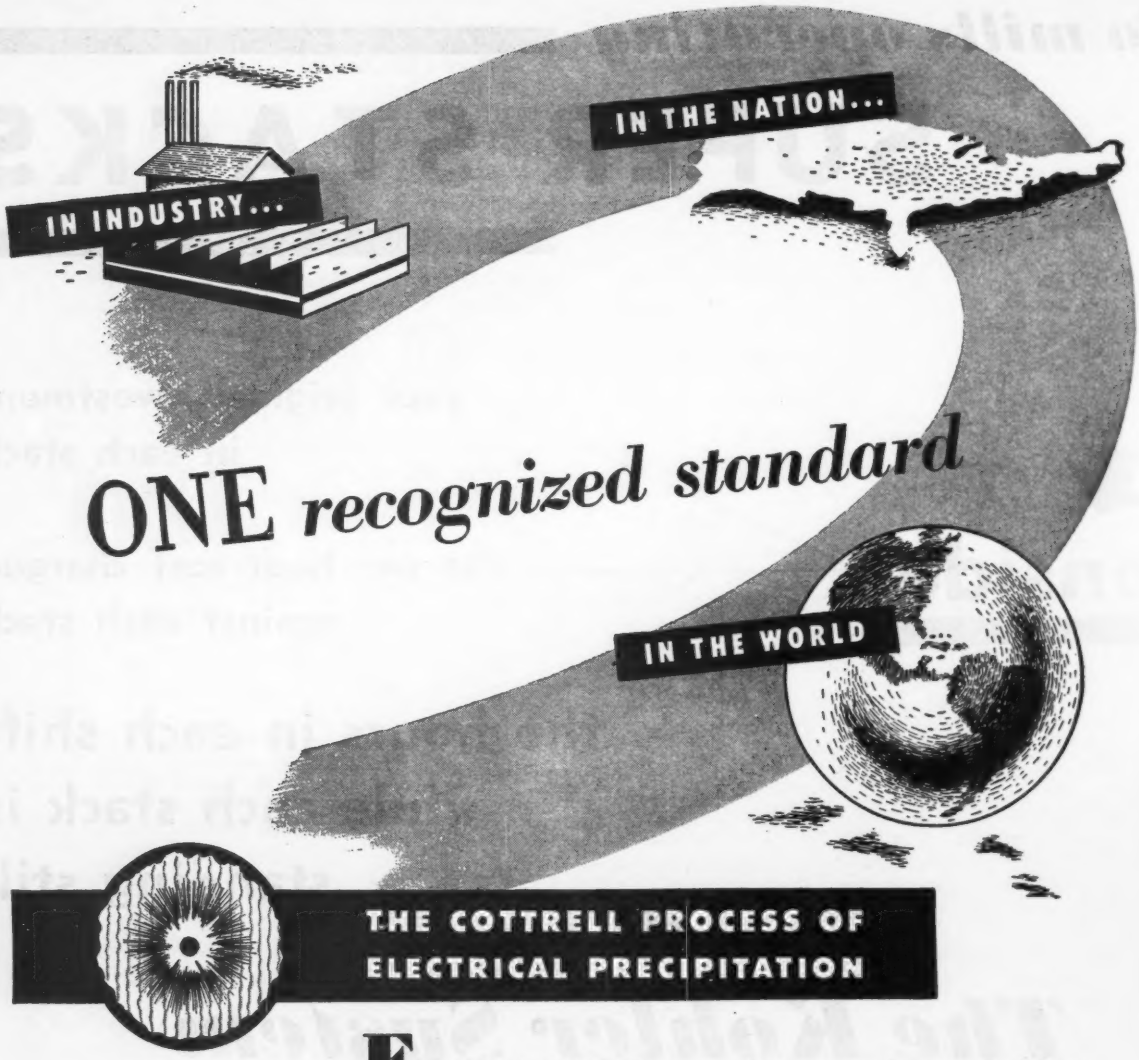

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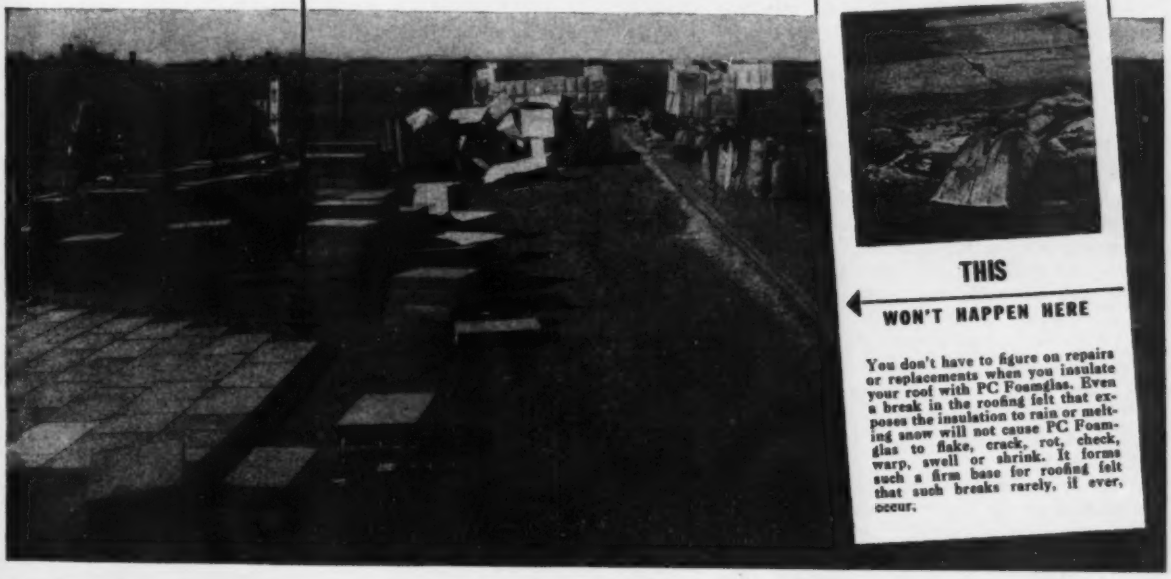

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extent, electric power when the logs are subsequently handled from the forest to the mill. Even water power is indirectly utilized when log rafts are floated down rivers to the sawmill.

Logs are moved from the woods to the mill according to the facilities available and the type of trees involved. In the fir and redwood areas the yarder is a vital unit at this stage of operations. It is powered by a gasoline or Diesel engine or sometimes by electric power. Other machinery includes a transmission and a suitable chain or gear drive to the hoisting drum. The entire mechanism is secured to a sled, made of two large logs fashioned as sled runners. A yarder is moved through the woods by its own power, a line from the drum being run to a stump, the unit skidded up to the latter, and so on until it is placed in the desired location.

When the yarder has assembled the logs at the "landing" they are loaded by the loader to railroad cars where rail transportation is used, or to trucks. Log hauling by trucks is most widely used today. The "landing" consists of a spar tree, either natural or erected by a rigger. Wire cable for hauling the logs is run from the yarder drum through blocks or pulleys on the spar tree. Yarders and loaders usually work from the same spar tree. The loader is similar to the yarder though smaller.

In pine country no yarders are used, the logs being yarded by crawler tractors. Sometimes portable loaders go right into the woods pick up the logs and place them on the load. In other words, the loader does some yarding, but usually the crawler tractor brings the logs to the "landing" where a portable loader makes up the load on trucks.

Sledding with a crawler tractor over thesnow and ice is practicable in winter insome Northern areas. Water transportation and log pond storage are of advantage in that dirt and stones are washed off and the logs go to the saws in wet condition. This leads to good sawing.

Where logs are handled to log pond storage they are floated one by one to a chain conveyor which extends from the log deck in the mill to beneath the surface of the pond. At this point, there is a spool or sheave around which the chain revolves. This chain is equipped with spikes or dogs which grip each log and carry it up to the log deck in the mill. The driving mechanism or log jack required to operate this chain is one of the heaviest duty machines in the mill. It requires a powerful reduction gear carrying the log deck sprocket wheel for the conveyor. This entire assembly is in almost continuous operation, but as it travels slowly, periodic examination and lubrication of the various parts can be readily made.

A steam kicker at the top end of the conveyor pushes the logs sidewise from the chain and onto the log deck. This latter slopes downward to the log carriage. A steam, air or electric "kicker" known as a "simonson" which is actually a log manipulator carries them onto the log carriage and then to the headsaw.

Whatever the log handling arrangements, the lubricating engineer is concerned with wire rope, steam cylinders, internal combustion engines, exposed gears and bearings.

Prime Moving Power

Steam

Steam power became most applicable in the saw mill when the industry developed into the heavy production class. Wood fuel was available at little or no cost and lent itself readily to raising steam of the desired pressure in a short time.

Oils for steam cylinder lubrication are selected according to the nature of the steam, the engine design and the operating conditions. Wet or saturated steam predominates, the average pressure being around 200 pounds. Steam temperatures corresponding to pressures within this figure, coupled with the moisture content of the steam, require the use of a compounded cylinder oil ranging in viscosity from 125 to 175 secs. Saybolt Universal at 310° F.

Compounding is necessary to develop emulsifying or lathering qualities when mixed with water. Compounding means adding a certain percentage of animal fat—usually lard oil, tallow or degras—to a mineral cylinder stock. The resultant lather has excellent adhesive ability, so it covers the cylinder walls and valve surfaces with a tenacious film which effectively resists being washed off by the exhaust or by the continual rush of fresh wet steam. Only a few drops of such an oil delivered per minute by a mechanical force feed or hydrostatic lubricator will keep the average engine cylinders well lubricated and will reduce steam loss by blow-by past the pistons or rod packing.

The steam serves as the carrier and distributing medium for the oil. Cylinder oil must therefore be delivered to the steam by means of a properly designed atomizer which will enable the steam to break up the oil into minute particles and thoroughly disperse them throughout the body of the steam before it enters the valve chest and cylinder, The atomizer should be located a few feet above or in back of the throttle valve, in conjunction with a positive feed mechanical or hydrostatic lubricator.

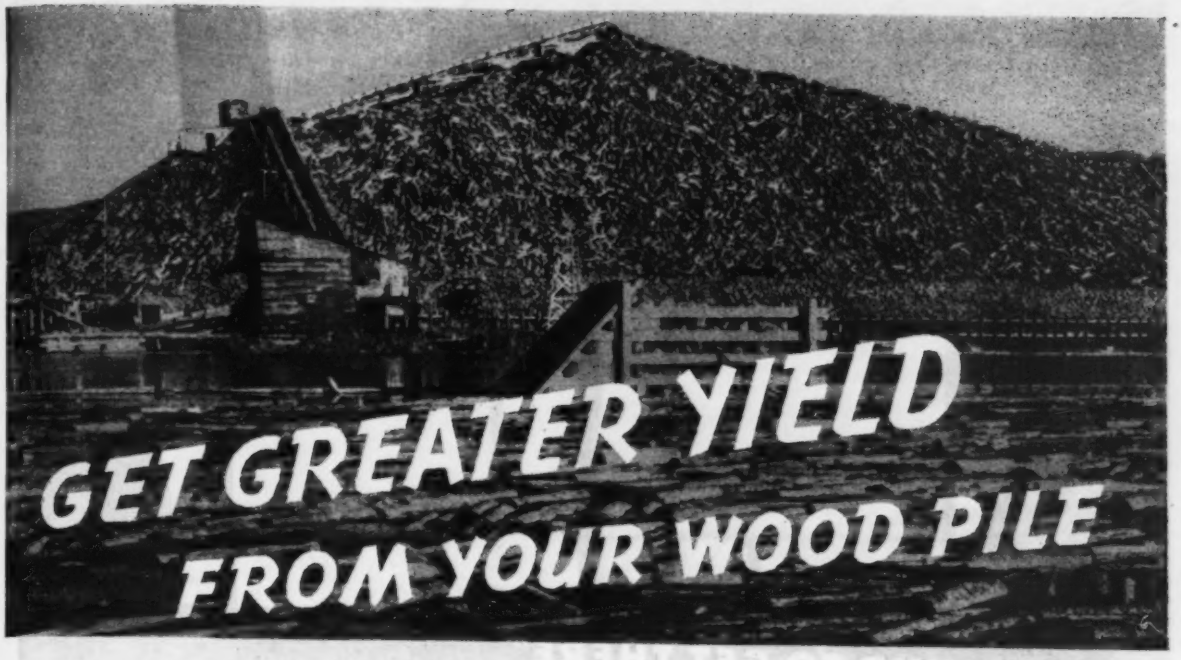
Steam cylinder oils for this service should atomize readily under the prevailing pressures. This is an important point to remember where the lubricator inlet or atomizer may have to be located close to the throttle valve.

Inasmuch as it is desirable for the oil to be completely atomized by the time it reaches the latter, the relation of steam pressure to oil viscosity must also be understood. The higher the pressure the greater the temperature; in other words, the greater the viscosity-reducing effect and the more readily will atomization be accomplished. An oil of, say 135 seconds Saybolt Universal viscosity at 210° F. will, therefore become thinner and more readily atomized by steam at 150 pounds pressure than by steam at 125 pounds.

It is general practice to regard 150 pounds of steam pressure as the dividing line, using higher viscosity oils above 150 pounds and lower viscosity oils where steam pressure is consistently below 150 pounds. Ability of an oil to atomize also will vary directly with the amount of compound used. Lower viscosity oils (from 100 to 135 secs. Saybolt Universal) containing from six to ten per cent of compound such as degras or tallow, can, therefore, be expected to be best suited to the moderate pressure wet steam conditions which prevail.

The Tractor

In recent years the tractor has invaded the "woods" just as it has so many other industries where "pulling power" is a factor. The crawler type tractor has definite advantages in logging operations; it is mobile, can handle heavy loads over rough terrain and is economical to operate. Where the ground will permit, the tractor can be used to do all the yarding of logs to the



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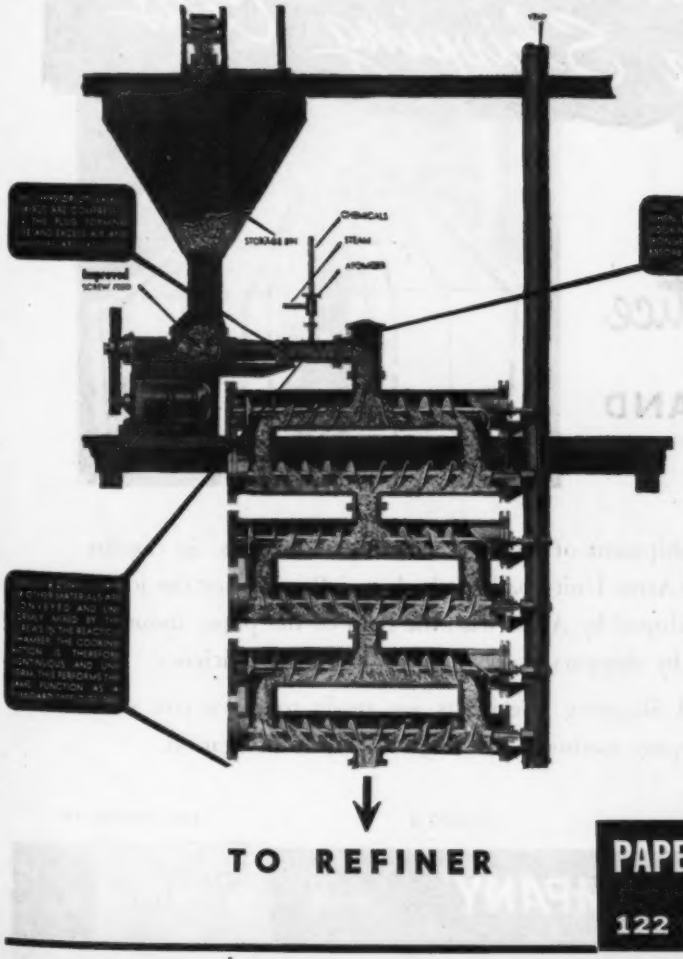

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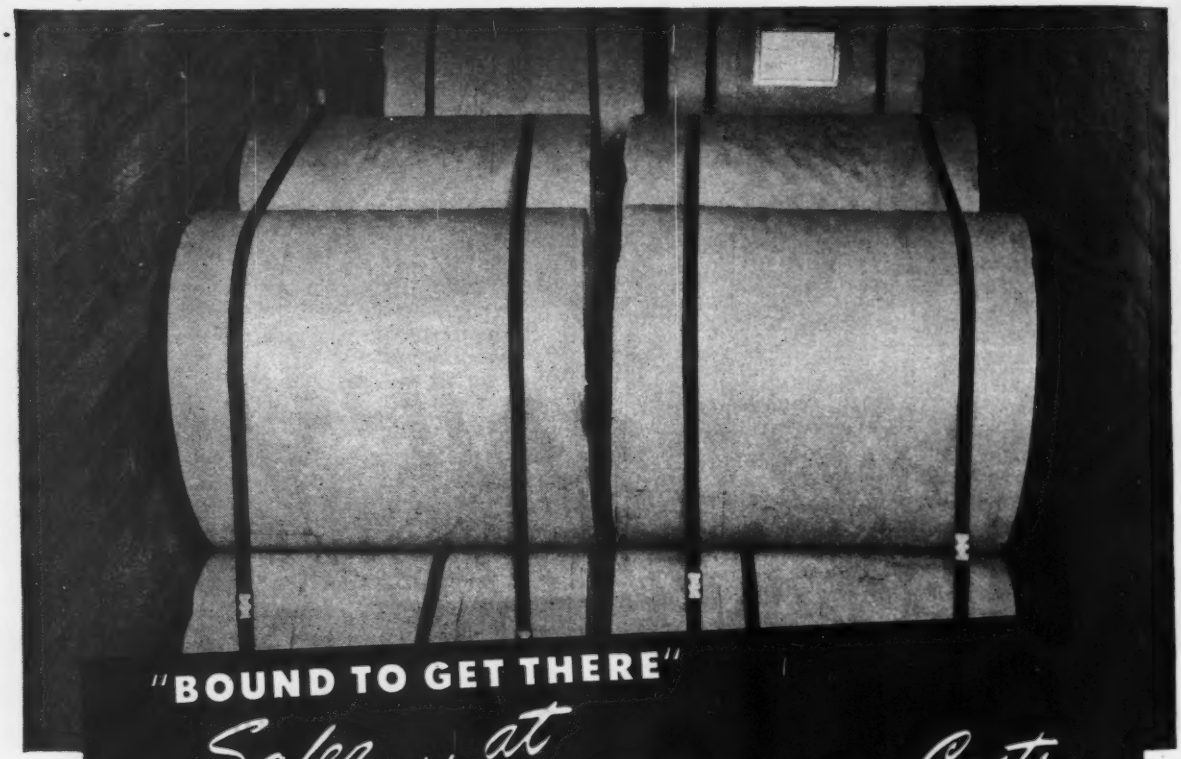

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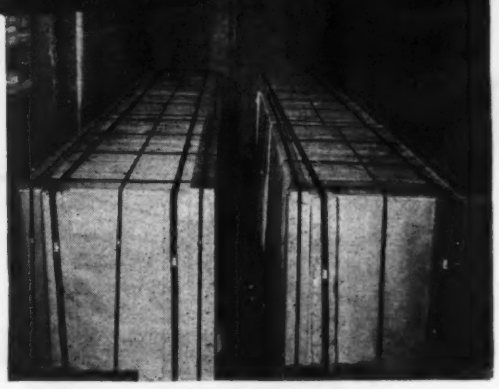

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loading point; it also can be used to supplement cable hauls to thereby reduce the need for "spar" tree rigging.

The Crawler tractor also can be hitched to a device known as an "Arch." This unit raises the ends of the logs up by means of wire cable and winches on the tractor. Since the ends of logs are raised they can be hauled easier and a tractor can haul more logs. Lubrication of the arch tracks is similar to crawler tractor tracks, other plain bearings on the arch take regular pressure gun grease. Some operators use skid pans in place of arches. . These pans are placed under the ends of the logs so they won't dig into the ground, thus the crawler tractor can pull more logs. Skid pans require no lubrication. Still other operators just pull the logs on the ground by the tractor without arch or skidpans.

The Engine

Tractor lubrication and its relation to operation is of distinct interest to the logging industry. By reason of the nature of the fuel, power and fuel economy are extremely important. Engine performance and maintenance costs are directly related. Any tractor engine which is lubricated with an oil which has been selected with due regard to the operating conditions, will be best capable of developing full power with the greatest fuel economy.

Full power becomes possible only where there is maximum compression and a clean engine. Compression is chiefly affected by carbon deposits and uneven seating of the valves, the movement of the piston rings in their respective grooves and the extent to which they maintain requisite seal between cylinder walls and piston to prevent "blow-by."

Piston rings take care of the more or less variable clearance which practically always exists between pistons and cylinders. These rings, therefore, must be able to move freely in their grooves. This can only be assured when they are free from carbon or gum deposits. Under such conditions, regardless of the age of the engine, or the variation in clearances compression losses will be practically negligible if the rings are not abnormally worn and if the oil film is of suitable thickness. On the other hand, rings which have worn unevenly, or become stuck due to carbon or gum formations, will reduce the power capacity of the engine and promote dillution of the crankcase oil by fuel blow-by.

Blow-by is objectionable in any engine. It will in all probability reduce, or, in many cases, wash off the lubricating film from the cylinder walls. The direct result may be scouring of the latter due to lack of lubrication, especially if dilution of the oil in the crankcase has occurred to an excess. Reduction in the lubricating ability of the oil film can easily lead to the consumption of more power in overcoming friction between the wearing parts of the engine. The thinner the oil due to dilution with fuel, the greater also will be the possibility of dangerous metal-to-metal contact between the turning parts and the main or connecting rod bearings.

Engines which require Diesel fuel will generally function at somewhat higher temperatures than a gasoline engine. This fact will naturally tend to aid in the attainment of more complete vaporization and offset the relatively low volatility of the heavier fuel. Yet it cannot do this completely; as a result, dilution is an ever present possibility and its effects must never be overlooked. In fact, crankcase dilution of the lubricating oil in any heavy-duty engine, using low-volatility fuels will be more prevalent than in the average automotive type engine which functions on gasoline. This is because Diesel oils vaporize less completely than gasoline; in consequence, the heavier unvaporized parts are ready and capable of exerting a solvent action upon the oil film on the cylinder walls and getting by the rings.

Track Roll Bearings

Crawler type track roll bearings require a considerable volume of lubricants, as application every eight hours, or every shift, is usually recommended when the equipment is operating. The conditions of operation are very severe as the tracks may be exposed continually to water-wash, mud or dust. The sleeve-type track end bearings must be given particularly careful attention due to the shock loads to which they are subjected. The most satisfactory lubricant for these bearings in warm weather is a grease containing a high viscosity mineral oil. In cold weather a grease of low temperature characteristics or a straight mineral oil is used.

Axle Design

Axle design is an important factor due to the tremendous loads involved. The double-reduction planetary-type drive axle is one of the significant developments which is facilitating truck operation today.

Where log trailers must be controlled over steep grades under full power, the rear axle assembly is the heart of the power transmission assembly. This assembly is made complete by the use of heavy-duty tapered roller bearings. Then, by completely enclosing the rear axle assembly in an oil-tight housing, bath lubrication becomes practicable, permitting the use of a quality extreme pressure lubricant which can meet the load conditions most effectually. Gear lubricants in this type of service should be drained, and the cases flushed and refilled every thousand hours.

Transmissions and Auxiliary Transmissions

In contrast with the differentials, the tooth loads on the transmission gears are considerably lower; this permits the use of a straight mineral gear lubricant of SAE 40 or 70.

Resistance to oxidation and foaming should be most carefully considered when selecting automotive gear lubricants.

Truck and Trailer Wheel Bearings

Truck wheel roller bearings often may have to be lubricated under widely varying temperatures and operating conditions. In the woods in winter the atmospheric temperature may drop to —40° F. In contrast, in summer operation in southern climates the maximum hub temperature may exceed 250° F. Naturally, a satisfactory wheel bearing grease must be soft enough to furnish good lubrication at the lowest operating temperatures likely to be encountered and yet have a texture which will prevent undue leakage at higher temperatures.

These intensive operating conditions require the production of wheel bearing lubricants to specifications which will conform to the expected temperatures Due to the exceedingly heavy loads carried and the necessity for maintaining low speeds, water is commonly used to cool the brakes; it may cause trouble if the wheel bearing grease cannot withstand the washing action. Sodium base greases are best adapted to these conditions and are superior for heavy-duty

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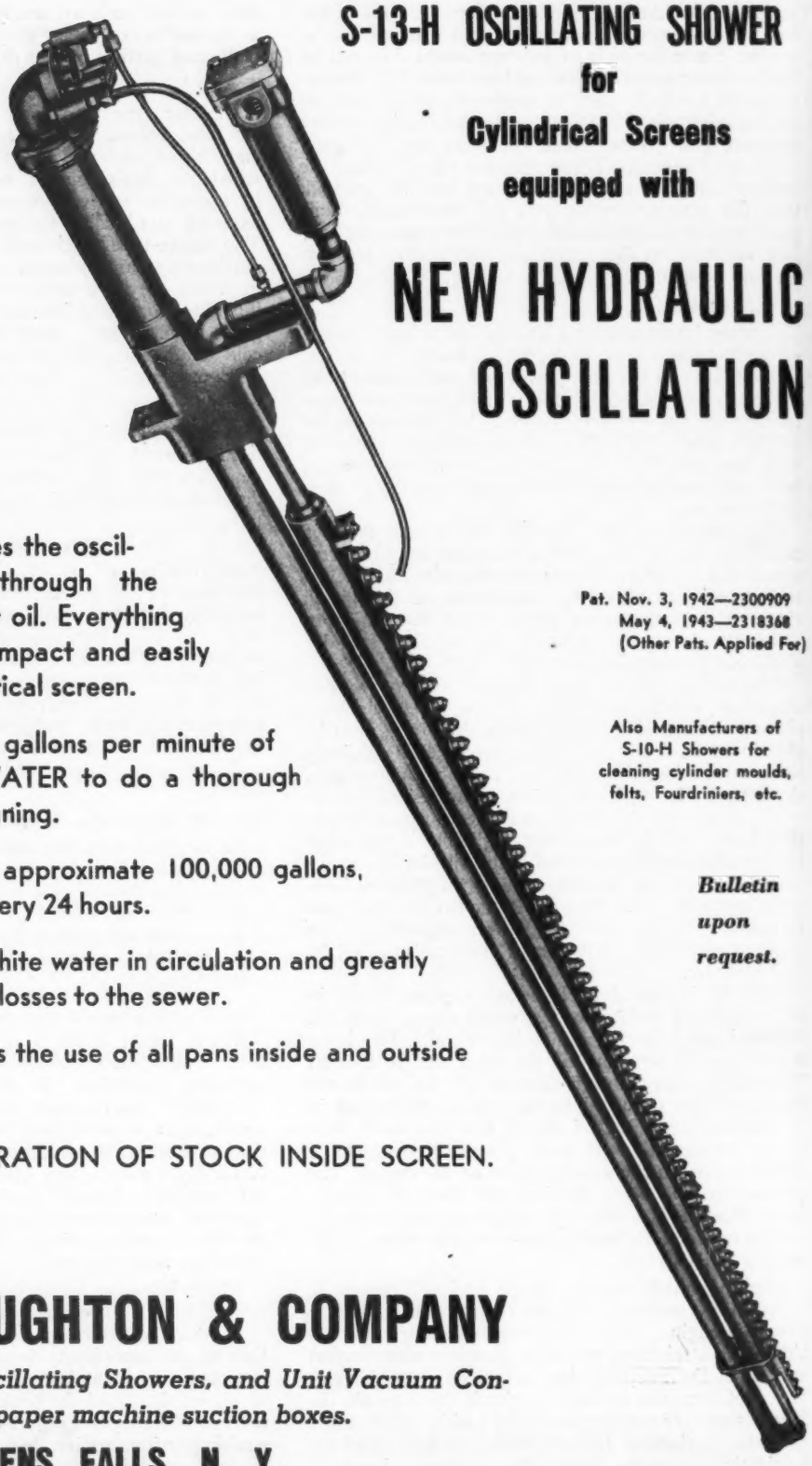

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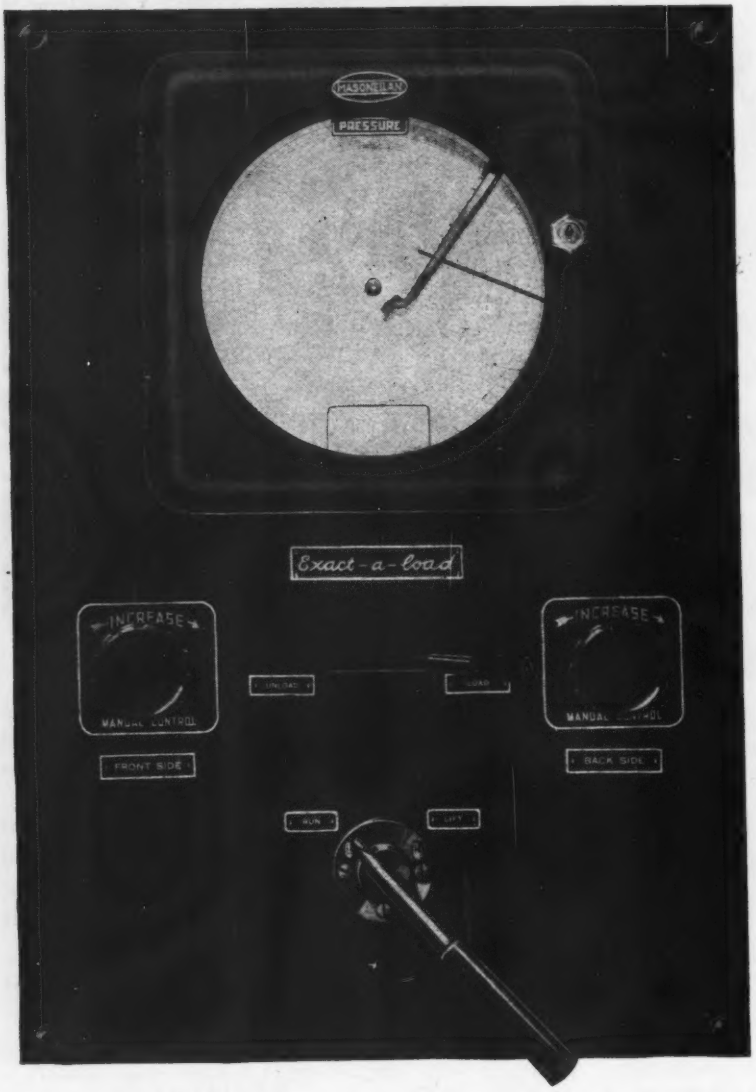

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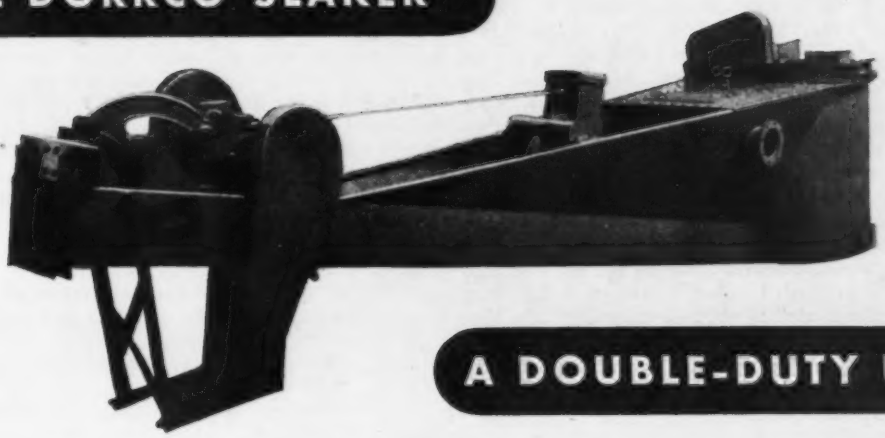

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wheel bearing lubrication because they have sufficiently high melting points to insure against separation or breakdown when exposed to the highest operating temperatures likely to be encountered in the wheel hubs. To meet this requirement a wheel-bearing grease for normal service should have a maximum usable temperature of at least 250° F. For low temperature conditions a softer grease is preferred. In either case, the texture of the grease is a most important characteristic; if the texture is "right" there will be a minimum possibility of leakage regardless of the temperature. A medium-heavy viscosity mineral oil in the grease is a factor in this regard. The percentage of sodium soap varies according to the oil viscosity and the desired consistency. Texture is a function of the ingredients and method of manufacture.

Truck Chassis Lubrication

A truck-chassis lubricant must conform to four important requirements:

1. Have lasting ability or long life.
2. Resist water washing.
3. Be adhesive, and
4. Form a protective seal to prevent entry of contaminating foreign matter.

Four basic types of greases are available for chassis lubrication viz.: calcium, sodium, aluminum or mixed base. The general range in consistency will be from semi-fluid to a stringy plastic.

Sodium base greases are preferred; they have the highest melting point of any of the above. Furthermore, they have the advantage of good stability and will not separate at temperatures in excess of some 350° F. While these greases are emulsifiable to some extent in warm water, solubility is negligible where the method of preparation is carefully controlled with respect to the viscosity of the mineral oil and amount and type of soap used. A sodium base grease of this type is unusually resistant to road wash and possessed of sufficient adhesiveness to form an effective seal around the chassis parts to exclude water, dust or sand; and to resist squeezing out and throw-off under road shocks and loads.

WIRE ROPE

Wire rope is a medium for power transmission in lumbering operations. Since logging is always an outdoor procedure, wire rope is continually exposed to the elements; load conditions are severe, and inspection is often difficult. All the while the rope must be dependable, otherwise hazard to the woods crew may develop and handling of logs to the sawmill would be retarded.

Wire rope operates at its best when the strands are protected against wear, rust and corrosion. Adequate lubrication gives this protection, consequently lubrication is one of the most important items in the lumberman's maintenance program. Lubrication begins with the selection of the lubricant, proper storage and intelligent application.

The service required of a wire rope controls its maintenance. The rigging for a "spar" tree is stationary and serves to guy the tree against excessive swing when shock loads are applied by the "yarding" or "logging" rig. The wire rope on the rig is movable, working over drums, much like the rope on a crane or hoisting engine. It is this movable rope which must be most carefully lubricated, for it is continually flexing as it runs round the drums. This develops friction between the strands; it also enables moisture to get into the interior of the rope. Rust or corrosion of strands at this point is most serious, for it is difficult to detect. All the while the strands may be rapidly weakening.

In brief, wear will occur in any wire rope in service. It is impossible to absolutely eliminate friction between individual strands, the rope surface and the sheaves or winding drums, regardless of the suitability of the lubricant or the attention paid to lubrication, although a suitable lubricant can mimimize wear. Also, deterioration through age or the effects of outside causes such as water or excessive heat can be offset by proper application of the right kind of rope lubricant.

Proper application means saturation of the core of a wire rope, and if the latter is not neglected after being put into service, it can be maintained at its maximum flexibility, with the core serving as an auxiliary source of lubricant supply.

A wire rope lubricant should never have a damaging effect upon the core fibres of the rope, for this will offset the lubricating ability. Products of a tarry nature which may contain a certain amount of acid would be detrimental and would fall in this category, yet in general appearance they might be very deceiving and similar to the more suitable straight mineral rope lubricant. Fillers such as flake graphite, asbestos, etc., also should be avoided for they will frequently be detrimental, especially if the rope is to be used under relatively low temperature conditions. Fillers may cause flaking or cracking of lubricating films in service to permit water or other destructive or corrosive materials to penetrate between the wires.

The most effective lubricants for wire rope are petroleum products in which consistency is a natural property. Lubricants of this type having a viscosity ranging from 500 to approximately 1000 secs. Saybolt at 210° F. will have a natural adhesive tendency and still be sufficiently fluid to assure of proper penetration.

A wire rope lubricant must never be too heavy or viscous otherwise its penetrative ability would be reduced. Then, while the exterior of a rope might seem to be effectively lubricated, the inner strands and core might lack the required amount of lubrication to prevent rusting and wear. And yet, many operators will have a tendency to treat their ropes with highly viscous gear lubricants which, while adequately adhesive, frequently cannot penetrate between all the wires or saturate the core to the desired extent.

Wire ropes can be relubricated in a number of ways. Troughs or split boxes through which the ropes can be passed during operation (if time permits) are very effective. Such containers can be filled to the necssary level with lubricant, heated if required.

Another method is to set up a barrel or drum above the rope so that the lubricant can drip from a suitable outlet valve. If practicable the container should be equipped with heating coils so that the temperature of the lubricant can be raised to make it flow more easily. Where such equipment is used, a brush for spreading, arranged so as to be relatively fixed in position and in contact with the rope, will be advantageous. By locating the bristles beneath the flow of fresh lubricant, they can be kept in saturated condition so that thorough spreading will be accomplished with the greatest economy.

Complete immersion insures perhaps the best penetration with the maximum of economy. But this requires removing the rope from the rig.

Lubricants for wire rope are very adhesive so they

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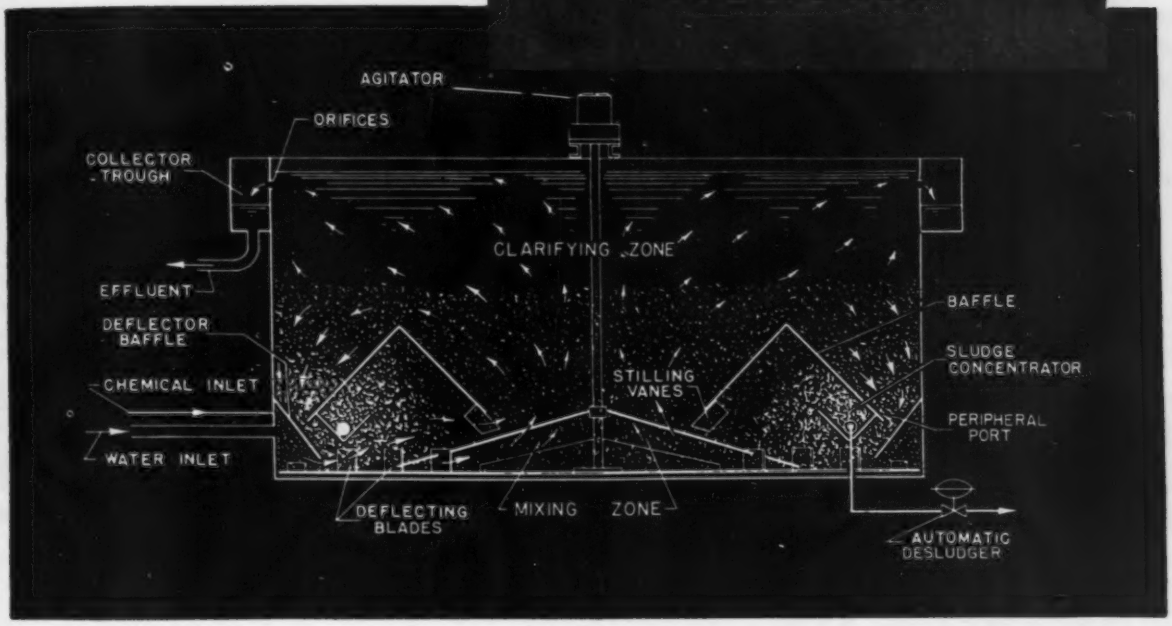

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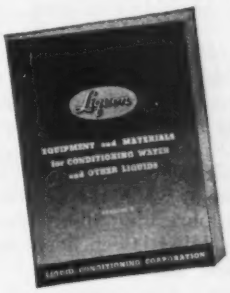

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may be difficult to handle. As a result, means of application such as the split box container or trough of oil-tight construction through which the rope can be run, is a very handy device. Flexing or working the rope around drums or sheaves while the lubricant is hot and fluid enough to find its way between the wires and down to the core is also good practice.

GEARS AND CHAINS

Chain lubrication is quite like bearing lubrication as far as the requirements which will be imposed upon the lubricants are concerned. There is, however, more chance for lubricant to be thrown off from a chain link than from the average bearing, for, even though bearings may be themselves subject to rotary or reciprocating motion, this will not be so severe as the action of centrifugal force on a chain. This force always is important when exposed or semi-enclosed chains are to be lubricated. Centrifugal force will be greatest during the period of bending, as the chains pass over the sprockets. At such times, any lubricant on the outside surface of a chain may be thrown off, although this will depend upon the adhesive ability of the lubricant and the surface speed of the sprocket wheels.

Wear in any gear or driving chain mechanism may be indicated by noise. Noise in a gear case cannot be associated with heat for, as a general rule, there will be good ventilation in the housing which will help keep the temperature down. So any increase in operating temperatures will not be too obvious, even in extreme cases of faulty lubrication of gear teeth or chain link connections, for the exterior of the case will generally be fairly cool.

Nor is it practicable to test the temperature of a gear or chain by hand due to the hazard involved. Even if possible it would be no indication of the probable actual temperature at the contact surfaces. Development of noisy, clanking operation, however, is a decidedly positive indication that a gear or chain lubricant is not functioning as it should to prevent metallic contact and solid friction.

In gear operation there will be periods during which the lubricant will be inactive, for actual contact between the teeth will only occur when they are in mesh. To a somewhat lesser extent the load imposed upon a chain link connection will also be decreased on the slack side.

Weather conditions may impose an unusual and severe duty upon an open gear lubricant in logging service. Temperature variations, loads and the possibility of considerable lubricant contamination must also be considered. All this requires that open gear lubricants should be adhesive and resist washing with water, also able to withstand heat and cold without flowing to excess or becoming brittle. The petroleum industry, being fully aware of these requirements has studied the refinement of gear lubricants. By judicious selection of crude oil stocks, methods of blending, and the use of water-resisting materials, products of remarkable lubricating ability have been perfected.

Lubricating ability is dependent upon the viscosity, the adhesiveness and the ability to resist prevailing tooth pressures. Temperature will affect both viscosity and adhesiveness in the normal operation of logging machinery. Gears must function at atmospheric temperature, and the range may be wide, although there will be but little possibility of the lubricant being reduced in viscosity by abnormal heat developed in the gears themselves.

Low temperatures require more serious consideration. Under these conditions unsuitable lubricants will have a tendency to become hard or brittle. Specifically refined gear lubricants resist this reaction. The normal viscosity range for service on exposed gears will vary from approximately 500 to 1000 sec. Saybolt at 210° F., the higher figure being more nearly right to meet the usual requirements.

Enclosed Gears and Chains

Gears which are enclosed or built into a chain drive assembly (as in certain power transmission units) will usually require a more fluid lubricant. The average enclosed chain drive will involve comparatively low clearances between the connecting elements which go to make up the links. The lubricant must be capable of penetrating to all surfaces of contact between these parts; otherwise, abnormal wear will take place. Here an oil of about the same viscosity as a heavy steam cylinder oil, i.e., in the neighborhood of 150 to 200 secs. Saybolt at 210° F. is advisable. The lead soap base lubricants have proven very effective in this service.

Sawmill Operations

Log-hauls or haul-ups handle logs from the log pond or store-yard to the saw-rigs. The log-haul drive is an important part of this unit. First sawing is done by the headsaw which is mounted in a headrig. A circular saw or a band saw is used in this rig. The latter is most commonly used in many localities for the first cutting which saws the logs into timbers, "cants" or slabs. In reality a band saw is a steel belt with teeth traveling around two wheels. It functions vertically and cuts on the downward side.

Band saws are from nine to sixteen inches wide and run at very high-speed—usually around ten thousand feet per minute, a feature which is gained by mounting the arbor assembly on roller bearings. Obviously the band saw is expensive, so it must be carefully protected. That is why some mill operators often take the precaution of using small adjustable circular saws for making the initial cut. These take any damage to the blade which might result from rocks or sand imbedded in the bark. Lubrication, in turn, protects the machine parts and reduces maintenance costs. Band saws are designed for either single or double cutting.

The log carriage controls the motion of the log and its contact with the saw, running the log (end-on) up to the head saw and holding it in position for cutting.

Logs must be expertly handled at the head-rig and every operation under manual control must be executed without delay. Here the head sawyer determines the maximum of marketable lumber which can be cut from a log and the best relative position for the first cut; he also controls the speed of the head saw.

Resawing is done with a bandsaw or circular saw when the timbers or cants are to be cut into board thicknesses. Circular resaws may be arranged singly or in gangs. Circular saws are also used in the "edger" which trims the bark or rough edges from slabs or boards. Gang saws are built with their saw blades set parallel to each other.

Conditions Which Influence Lubrication

The loads developed by the strains imposed in sawing must be considered in deciding upon the types of lubricants which will assure of most satisfactory operation of sawmill machinery. Of almost equal importance are the speed conditions and the necessity for studying bearing design to prevent lubricant contamination.

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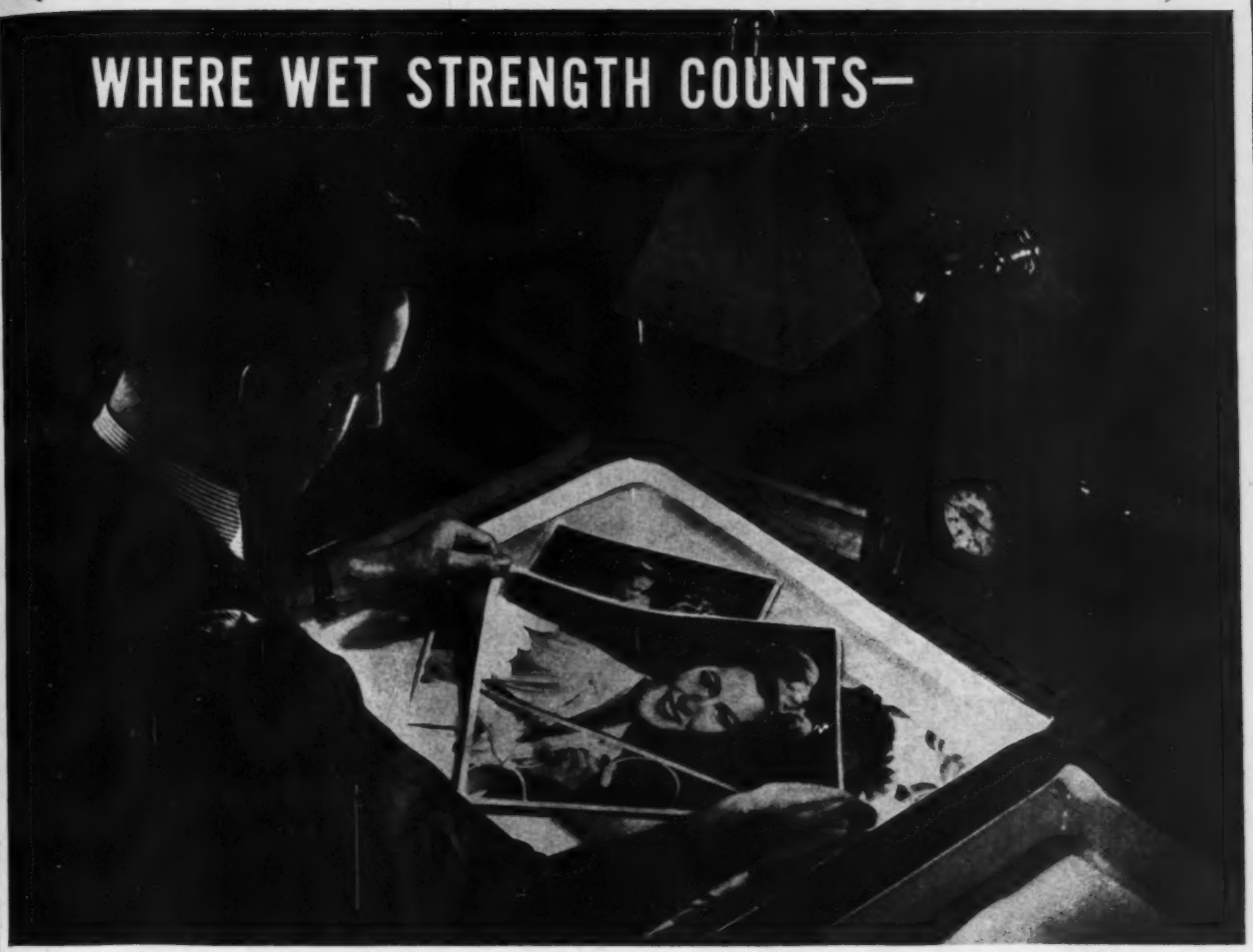

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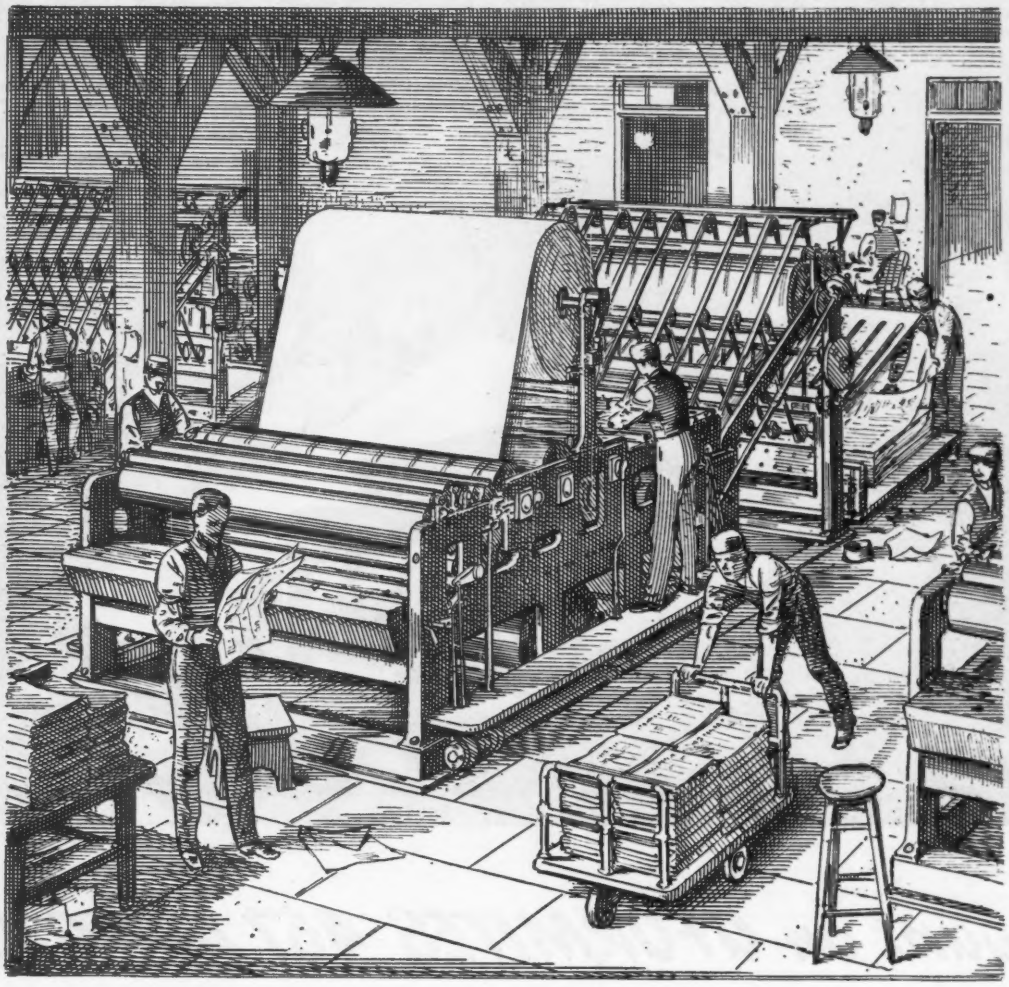

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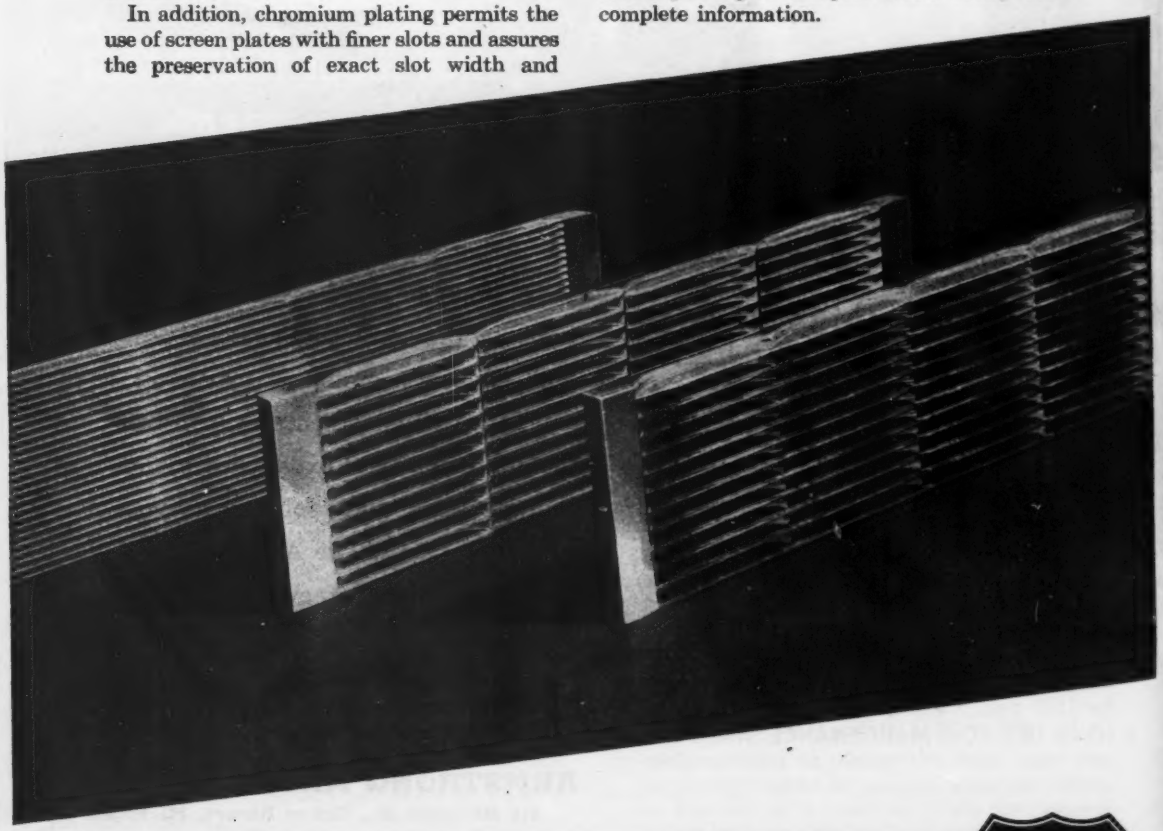

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Both the bandsaw and resaw must operate under a heavy strain, for saw tension must be strong and uniform to prevent "snaking" or cutting of a non-uniform line. This strain is extended to the band-wheel arbor bearings. Lubrication requirements will vary according to this strain and the design of the bearings.

In band saw-wheel sleeve-type bearings which are subjected to some 2800 rpm wheel speed and a saw strain of around 35,000 lbs., oil must be directed to the bottom half of the upper wheel bearing and to the top half of the lower wheel bearing. Collar oilers are widely used for this purpose. These bearings carry all the load. Frequently they are water-cooled to maintain uniform temperatures. Under such conditions, a heavy straight mineral industrial machine oil is usually required.

Other types of band mill saws which have their arbor bearings equipped with anti-friction bearings require grease lubrication. A medium-bodied product (within the N.L.G.I.* No. 2 range) refined to meet the stability requirement so important in ball and roller bearing service should be used under such conditions. Greases of this nature possess a factor of safety in respect to their ability to function over a wide temperature range and strong resistance to oxidation.

Log Carriage Manipulation

The log carriage may be operated electrically or by steam. Improvements in electric motor bearing design have simplified materially the problem of lubrication on all electric-powered mill machinery.

Where steam is used the difficulties attendant to cylinder condensation, wet steam and frequently considerable pressure drop must still be considered. The steam driven carriage is operated by plunger mechanisms usually known as "shotguns." They are hand operated, so the valve motion must be sensitive, for they are worked continually by the sawyer. If they become dry, reduction in the cut will result. These valves present one of the most difficult lubricating problems in the sawmill. The secret is to provide an oil which will keep them as sensitive as possible, they rarely show any wear, but they must function at the slightest touch.

A highly refined, compounded steam cylinder oil is generally used having a viscosity range of 125 to 160 secs. Saybolt at 210°F. and a compound content of around five to ten per cent. This same oil can also be used on other steam operated mechanisms such as the "steam nigger" which turns the logs on the carriage. This oil will develop the necessary lathery film of lubricant and it can be readily handled by central pressure lubricating systems.

The devices that hold and adjust the logs on the carriage are known as dogs. They are operated by the set works. The power used is either hand, electricity or air. Air-powered dogs present a lubrication problem in that—(1) they are usually quite remote from the main air source, and (2) there is usually considerable condensation due to the pressure drop which causes excessive rusting. This can be overcome by using a high quality lubricant containing a suitable fixed or fatty oil which will emulsify with moisture.

Carriage and Set Works

The bevel gears on the carriage drive the set works which control the cut. It is important that this mechanism work freely under all conditions or the lumber cut will vary in thickness; also a sluggish set works will reduce the total footage run through the mill. The bevel gears are usually enclosed and if the case is oil tight use an SAE 140 gear oil for summer and SAE 90 gear oil or SAE 40 motor oil in winter. Should the gear case leak a light grease can be used with satisfaction to stop leakage. Where the gears are exposed a suitable open gear lubricant can be used. The exposed screws which control the travel of the log blocks are best lubricated with a light cup grease containing graphite.

Edger-Trim Saw
Gang Rip Saw—Slashers

The extent to which these units are used depends upon the type of mill and the type of lumber being processed. The gang saws cut the "cant" or timber into more marketable sizes, or strips of from one to two inches thick. The gang saw consists of a row of saw blades set parallel in a vertical frame. It is driven by a crank through a connecting rod which imparts the necessary reciprocating or up and down motion. All parts must be rigidly constructed, as it is desirable to saw several "cants" into boards simultaneously.

The gang saw crank must be very carefully lubricated. It is another mechanism which carries a heavy load, and so becomes subject to considerable heat. Pressure lubrication is, therefore, desirable. If it is not employed, a compound engine oil is used in some mills in conjunction with a spray of water projected on the crankpin bearing. Others use their regular cylinder oil.

Edger mandrels require a lubricant which will stick tenaciously and resist being thrown off. The arbor bearings, in turn, may be either collar-oiled, water-cooleed sleeve bearings, or of anti-friction type. The latter are provided for grease lubrication. In either case lubrication is relatively automatic and protected against contamination by sawdust. The same holds true for the modern feed and press roll bearings.

Conveyors

In every phase of the lumber industry there is a chance to use some form of conveyor to good advantage. From the log pond to the handling of finished marketable products a conveyor is used to move materials to and away from the saws, to the kiln buggies and to points of storage. The chain type of conveyor has proved its adaptability to this service. "Live" rolls are also used. These are rolls under constant rotation, being driven through a power transmitting connection. "Live" rolls are very effective in handling logs up to the headrig.

Lubrication

Lubrication of conveyors involves protecting the various bearings against undue wear or excessive corrosion. Abrasive foreign material causes wear; water causes rust and corrosion. Lubrication materially reduces these detrimental effects by maintaining a protective film on the contact surfaces of the moving parts.

Either oil or grease can be used for lubrication according to the design of the roll bearings. Where sleeve-type bearings are involved, oil lubrication by means of cups, or ring or collar oilers is usually required. Grease cup or pressure gun lubrication is

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equally as effective especially if high clearances prevail. Wherever ball or roller bearings are used, grease is generally required.

Chain Conveying

The pintle link principle is used in chain conveyors designed for log handling and sawmill service.

Grease lubrication by pressure gun has proved to be very protective in such chains. By cutting away the link within, a grease chamber is developed which holds a reserve supply for protection of both the pin and link surfaces. This careful consideration has been given to lubrication in the realization that wear (by entry of abrasive foreign matter) may seriously mar the contact surfaces of the links.

Kiln Drying

After all the necessary sawing has been done, lumber is prepared for the market by kiln drying to evaporate most of the moisture it contains. Kiln drying is a mechanical process of aging or seasoning. It is most essential to the production of uniform grades of materials and the prevention of subsequent warping or shrinkage. So boards, after they leave the gang saws, edgers and trimmers are loaded onto kiln trucks and passed into steam-heated dry kilns.

Kiln seasoning accomplishes the same results as air drying in the open, but in far less time as it is carried out at a temperature from 240 to 340°F. From sixty to seventy-two hours are required, according to the character and thickness of the lumber whereas air drying would take many weeks. Due to the combined high temperatures involved, kiln truck axle bearing lubrication is important. Grease lubrication by means of a pressure gun is generally used as it is felt to give best protection of the axle bearings. The operating conditions require the use of good anti-friction characteristics which will stand comparatively high temperatures. By using such a lubricant, there will be best assurance against grease breakdown, and formation of detrimental deposits. The heavy oil content in turn assures that such a grease will stay put and resist leakage when exposed to kiln temperatures while the cars are in the kilns.

Kiln fan bearings are akin to electric motor bearings, so they are lubricated in a similar manner. Frequently they are of anti-friction type. Wherever the installation may be exposed to high temperatures it will be advisable to use a grease comparable with that suggested for the kiln cars. Where oil lubrication is necessary, a medium to heavy-bodied straight mineral oil should be used according to temperature conditions. Wick oilers are applicable to the lubrication of these bearings.

Air Compressors

Lubrication of air compressors in sawmill service is important due to the possibility of sawdust being drawn into the system with the intake air. For this reason the air intake as well as the compressor should be located in such a manner as to preclude entry of sawdust. An added precaution is to install a suitable air filter at the intake. With these precautions mill compressor cylinders can normally be lubricated effectually with a highly refined straight mineral compressor oil of around 300 seconds Saybolt Universal viscosity at 100°F.

Successful performance of an air compressor is contingent upon:

1. Controlled lubrication—to insure positive feed of just sufficient oil to lubricate the cylinders properly. This can be judged by the condition of the valves and cylinders.
2. Clean cold air—to reduce inlet temperatures as far as possible, and to prevent dust and dirt from entering the system.
3. Suitable intercoolers, and an aftercooler—of sufficient size to permit condensation of oil mist and moisture carried over by the compressed air.
4. A receiver—also to remove condensed oil vapor and moisture.
5. A low carbon residue lubricating oil—within the viscosity range desirable to meet the operating temperatures, piston ring tension and bearing clearance.

Electric Motors

Sawmill motors may be equipped with ring oiled plain bearings, or ball or roller bearings.

Ring Oiler Requirements

The ring oiler on a heavy-duty motor bearing is an automatic oil circulating device of the most simple type. It stands hard service, but can become inoperative due to contaminated or unsuitable oil, for the ring must hang freely on the shaft if it is to turn and carry oil to the top. Any gumming or accumulated foreign matter in the ring slot may interfere with this movement. If the ring becomes stuck, it may lead to starved lubrication and a bearing renewal job if not corrected. This makes it advisable to flush and refill all ring-oiled bearings every one or two months according to how dusty the operating conditions may be.

Highly refined straight mineral oils are recommended for ring oilers—oils which are resistant to oxidation and gumming. Normally a viscosity range of from 150 to 500 secs. Saybolt Universal at 100°F. is desirable. It is especially advisable to specify low pour test so that the oil will not become too sluggish in cold weather to keep the rings from turning freely.

Motor Ball or Roller Bearings

Grease lubrication prevails on these bearings. There is considerable responsibility attached to the selection of greases for a ball or roller bearing as a precision mechanism is involved which can be damaged severely by corrosion or loss of seal. Accordingly, a ball or roller bearing grease must be primarily a specialty lubricant, composed of highest quality ingredients and designed to resist breakdown when subjected to oxidizing conditions. Such a product must also resist separation of the oil and grease leakage from the bearing.

Conclusion

Logging and sawmill operations have come a long way since the log cabin days of our forebears who were the first woodsmen in the country. Today the industry is organized and man-control has largely succeeded man-power. Along with this organization of the industry has come the use of the most economical methods of power generation, elimination of unnecessary steps in handling the material, marked reduction in waste, and realization that power consumption, regardless of the machine, is directly related to lubrication. The Petroleum Industry has contributed to this progress by intensive research, by preparation of lubricants which, when selected to meet the operating conditions, will keep machines running when it is most essential for them to run.

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NATURAL AND SYNTHETIC RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS

From Plunger Down to Standpatter

By J. F. Moriarty

In the paper industry, as in other industries, a firm is given one of four ratings: Exceptionally Progressive, Progressive, Conservative and Standpatters. These exact names may not exactly be mentioned by paper mill executives or by men who sell equipment to the paper industry, but that is the loose identification used.

If a firm is on its toes and quick to take advantage of new ideas and new products that fit its business, they are considered exceptionally progressive. Other firms feel they are progressive too, but they may stand flatfooted. They do believe in changes and want to buy improved equipment, but not until they have done some thinking and much investigating.

The Conservatives lean to the right definitely and believe the old ways are still the best. It takes a lot of persuasion to get them to change. As for the Standpatters, the makers of improved mill equipment don't bother to put them on their prospect lists.

Few will argue that the rating of "Conservative" or a "Standpatter" in today's business world is preferable to that of the "Exceptially Progressive" or the Plain Progressive". For those who insist in remaining in the two lower ratings the results will probably be short of expectations.

Probably no plant manager will state that he is entirely satisfied with the methods used by his organization to move materials into the buildings, through manufacturing processes, to storage and out the shipping room door. These men usually feet a bit proud when someone brings out the cost figures of ten years ago and compares them with current costs. The comparison shows a startling improvement because much progress has been made in the handling and storing of goods in that decade. The executives who deserve much of the credit for the gains feel there is further room for improvement and are constantly on the hunt for it.

When the bulk of the movement was accomplished by hand and foot power it was natural that when motorized equipment was brought in to speed the operation it was found that the cost of handling each article on each ton was cut in a very large way. In those times it was possible to cut handling costs as much as the 40 to 60% that was widely advertised by the makers of several different lines of power equipment. And naturally as improvements were made and new wrinkles in handling and storing goods were devised the percentage of savings dropped to more modest figures. Even so, a rather insignificant 5% if figured on annual costs of 100,000 dollars and up means an attractive saving.

Some paper mills have long enjoyed the benefits of labor saving materials handling devices. Going back to 1911 when the adoption of the hand lift truck system which replaced the four wheel floor truck and the two wheel type stevedore truck to a large extent—that was still hand power but the system boosted the production of each "trucker" and actually a man with a hand lift truck accomplished as much moving per day as several men with the old type trucks. It was a case of eliminating extra handlings by keeping goods stored on skid platforms, also by increasing the pay load that each man moved. Loads larger in volume and in weight were handled.

The successful experience with the new lift truck-skid platform system created an appetite for further savings and put the mill executives in an inquiring frame of mind. It was not hard to sell many of the mill managers of substituting battery operated trucks from the hand drawn type, as a demonstration quickly proved that the self-propelled units could with a single operator outperform three to five men who depended on their brawn entirely. These venturesome executives piled up savings for the stockholders because they were willing to take chances on a system that had yet to be proved. Those who preferred to move more slowly and cautiously found later that their more daring competitors had piled up impressive sums in the treasury in a scant two or three years. This was the "plain progressive" type.

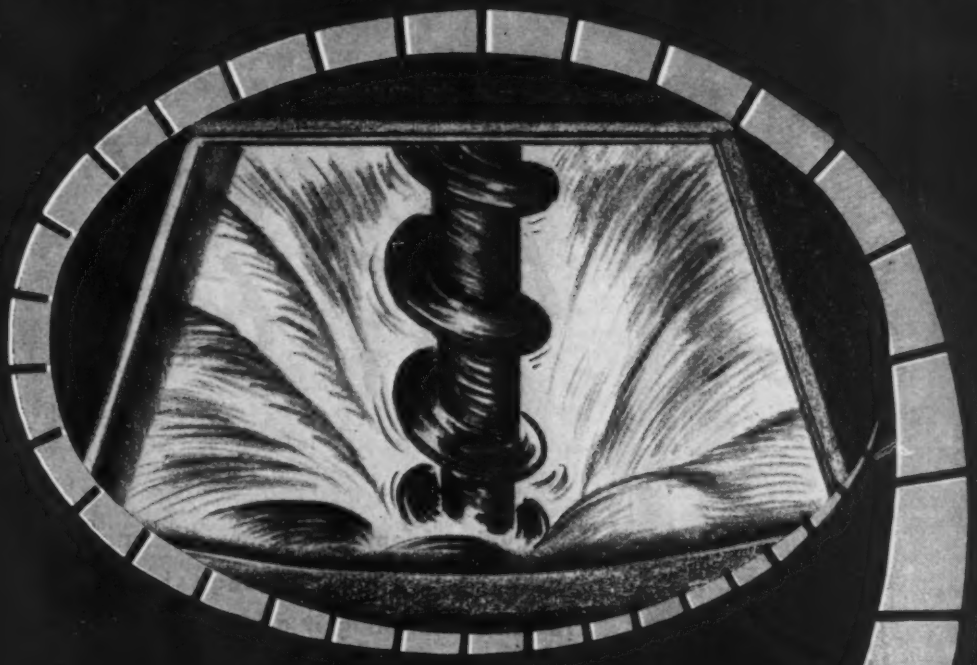
Those that trailed had the satisfaction of knowing that when they embarked on the new program that there was little risk to worry about. The more venturesome in the industry had eliminated the risk. Their only worry then was to select the best of a half dozen brands of equipment that were offered them. Even then some of these executives believed in taking plenty of time to compare the devices on the market with the idea in mind of getting the most value for their investment. Certainly it was the proper thing to do up to a point. But if the process required a wait of another year during which time they "enjoyed" the disadvantage of the old methods with the higher costs that was something else. It would have paid these firms to cut their investigating time two-thirds and get the benefit of the battery operated machines for two-thirds of the year, even if later they found they hadn't chosen the very best.

The head start gained by those firms who got started early could have put them in a position to improve the production of their mills over competitors and to effect an overall saving which would permit them to take business away from others not situated so well. It is often demonstrated to the dismay of firms that while a certain amount of caution is desirable too much has its financial drawbacks.

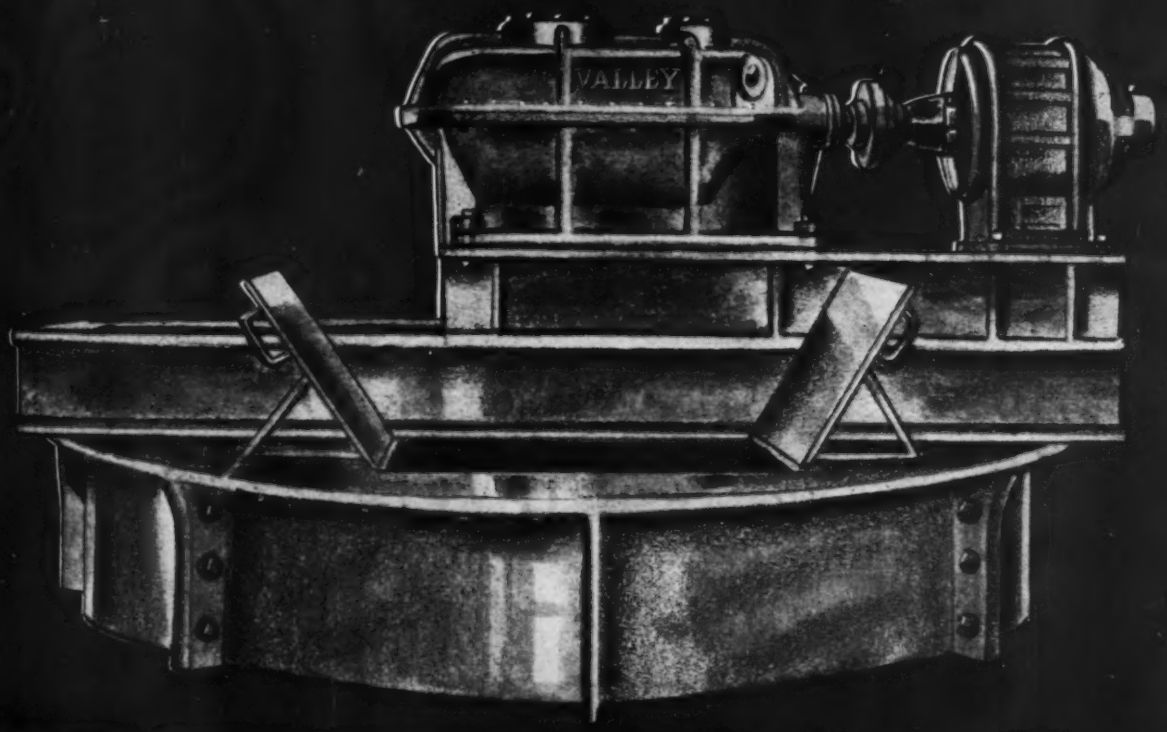
Today with many proved makes of labor saving equipment on the market it is questionable whether a long delay in purchasing is at all justified. Suppose a quick selection of a power truck had been made and after a few months it was found that the product had its shortcomings. That equipment, nevertheless, would effect savings the first year far beyond its cost and could be replaced with something better. The equipment could be sold or could be kept as a "spare" and would prove very helpful when emergencies arose.

In everyday life we know that when we buy something that is new we may not be satisfied, but we don't approve of people worrying about the risk and waiting a year or two before they buy the much wanted motor car, the electric refrigerator, the gas stove or the oil heater. The best liked article of this type has its shortcomings too, but, nevertheless, it provides conveniences and adds to the comfort of those in the home. It doesn't hurt a great deal to be told that some

THE VALLEY-VORTEX PULPER



. . . introduces a <u>new</u> combination
of terrific pulping effects
in <u>ONE</u> GREAT PULPER



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Every Provident Group Insurance program is based on a thorough study of the firm installing it and is carefully "tailor-made" to fit the protection needs of the employees to be insured.

Provident Group Insurance plans, now protecting more than one million workers and dependents, can be written to include Life, Accident and Sickness, and Hospital-Surgical insurance—at a cost every employee can afford. The Hospital-Surgical benefits can even be extended to cover dependent members of employees' families.

Through years of experience and close association with leading firms in every branch of business, the Provident has developed a staff of specialists who know how to best serve the group insurance needs of the paper industry and its employees. Their assistance is yours for the asking—and at no obligation.

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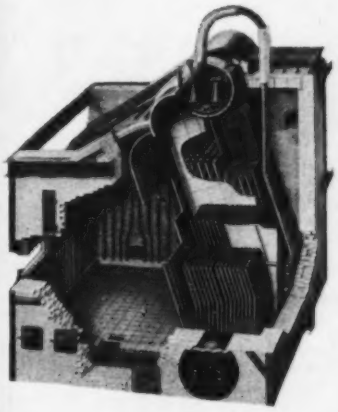
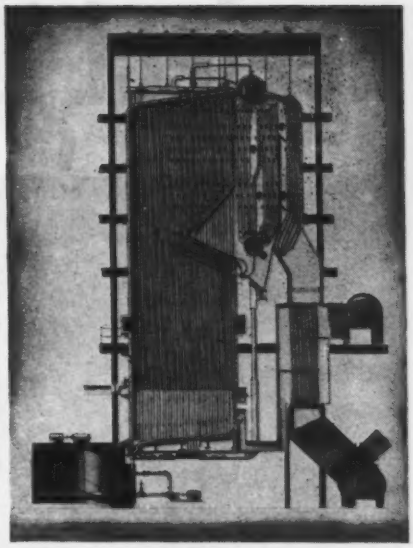
B&W's broad familiarity with the paper industry for over 60 years pays dividends to mill operators in terms of continuity of service, operating efficiency, and greatest return on investment wherever B&W equipment is used. Consult our nearest office for prompt cooperation in modernizing existing plants or planning future developments.

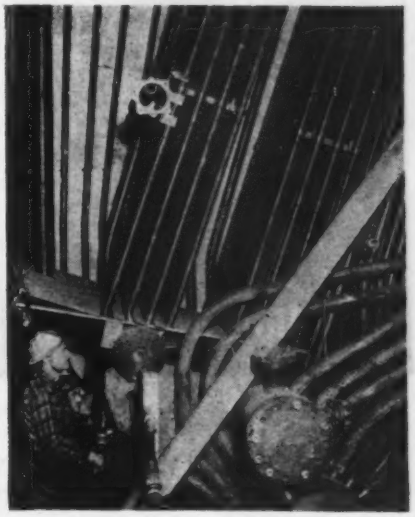


BOILERS. The complete line of B&W boilers and related equipment meets all paper mill requirements for dependable, low-cost steam generation in any combination of capacity, pressure, temperature, fuel, and space conditions.



RECOVERY UNITS. High chemical recovery, dependable steam generation and ability to handle wide variations in black liquor concentrations are obtained at low cost in sulphate paper mills with B&W-Tomlinson Recovery Units.

PRESSURE VESSELS. Sizes and shapes of dependable welded construction for any paper mill requirement can be fabricated by B&W from carbon, alloy, or clad steels. All vessels are x-ray inspected and stress relieved. These 30-ft. pulp-digester tanks were designed for a working pressure of 150 psi.



TUBES. Seamless and Welded Pressure Tubes are made by B&W in a full range of analyses from low carbons to high alloy steels including stainless steels, for any high-temperature, high-pressure application in paper mill equipment.

5-71

Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

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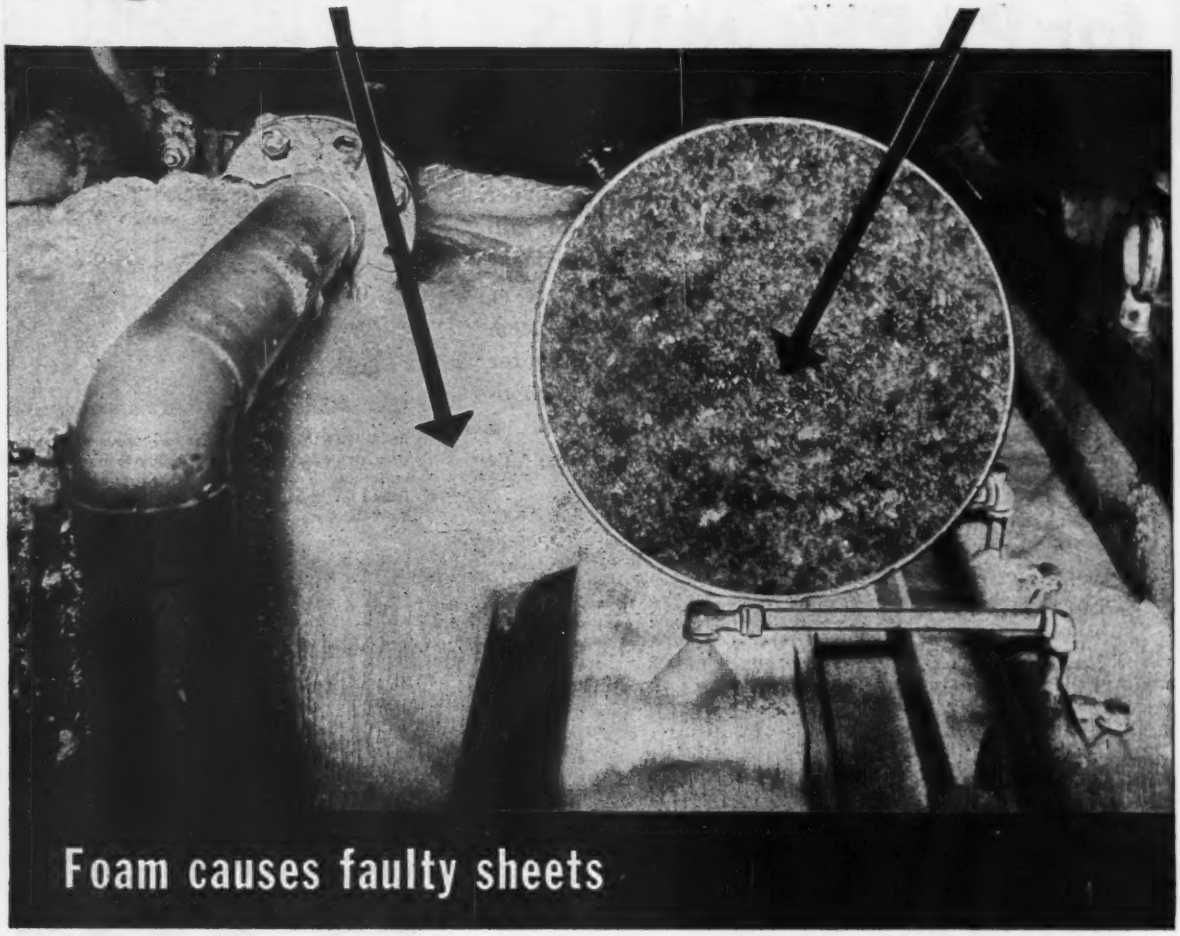

Foam causes faulty sheets

Failure to control foam in the head-box, cylinder vats, screen boxes, or on the wire jeopardizes paper quality through thin spots or faulty paper formation.

Don't give foam a full head—smash it *quick* with NOPCO-KF. It's not unusual for NOPCO-KF to clear the head-box of foam in less than two minutes, the wire in less than five minutes.

Thin Spots 75% Eliminated

Even in capacity operations, NOPCO-KF . . . the super "bubble buster" . . . dissipates entrained air—the common cause of thin spots—as if the stock were being handled at slower speeds. That's because NOPCO-KF keeps working on the wire. This positive foam control, plus better fiber dispersion, improves sheet formation.

Other NOPCO-KF advantages—reduced breaks, improved surface characteristics, increased water repellency, conservation of paper-making material. Test this NOPCO chemical—expressly formulated to aid sheet formation—in your *mill*. Order enough for a trial run. Write, wire or phone.

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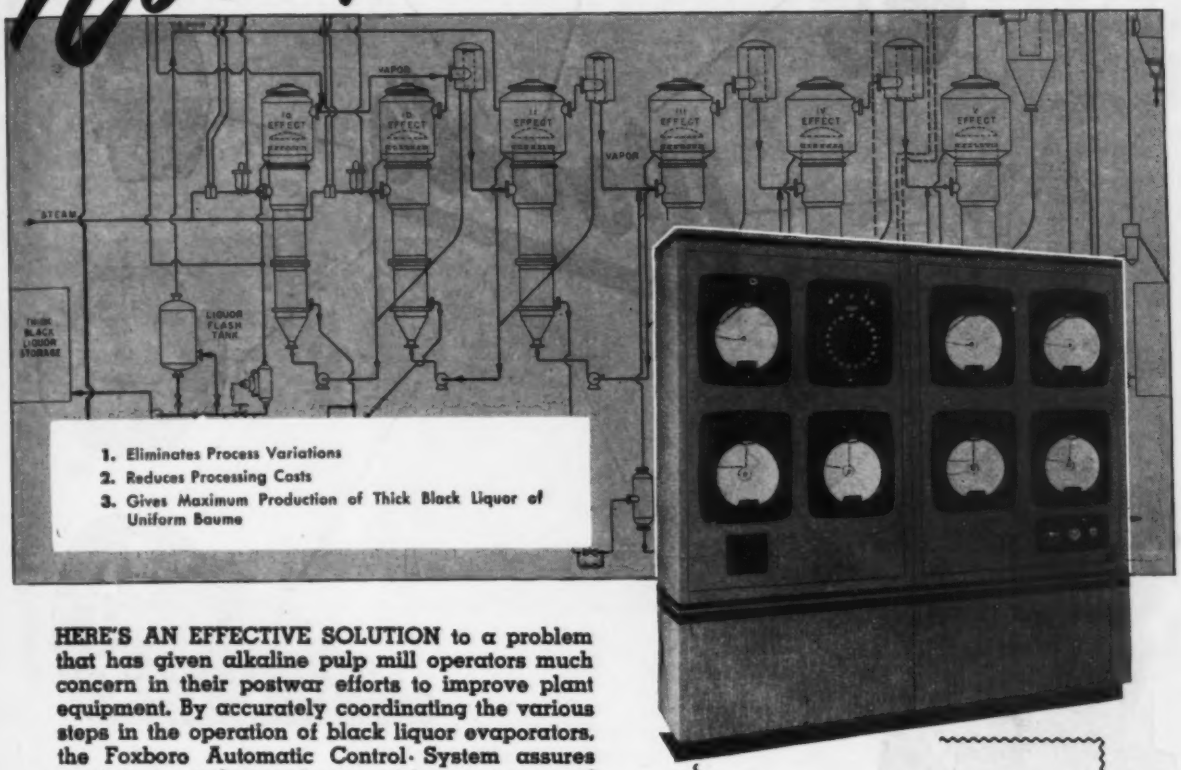
NOPCO-KF

NOPCO **EVOLVED THROUGH RESEARCH**

Now! Complete . . . Automatic EVAPORATOR CONTROL



1. Eliminates Process Variations
2. Reduces Processing Costs
3. Gives Maximum Production of Thick Black Liquor of Uniform Baume

HERE'S AN EFFECTIVE SOLUTION to a problem that has given alkaline pulp mill operators much concern in their postwar efforts to improve plant equipment. By accurately coordinating the various steps in the operation of black liquor evaporators, the Foxboro Automatic Control System assures maximum rated capacity at minimum steam and labor costs.

Consider this automatic evaporator control system as a specific project for your modernizing program. You'll find its "Packaged Unit" construction will avoid many installation headaches—only a few simple, external connections are required. You'll profit immediately by its remarkable efficiency—the "last word" in centralized control.

Evaporator instrumentation was pioneered by Foxboro Engineers in the early 1930's. It has progressed to its present-day "packaged" form as a result of continuous field experience and research plus tested and proven applications throughout the United States and Canada. Today, this Foxboro "packaged" unit has the endorsement of evaporator manufacturers and mill operators alike.

Write for descriptive literature or discuss this project with your Foxboro Field Engineer. The Foxboro Company, 114 Neponset Avenue, Foxboro, Mass., U. S. A. Offices in principal cities.

Here's what it does

1. Automatically Controls Steam Input.
2. Automatically Controls Thin Liquor Feed.
3. Automatically Controls Thick Liquor Baume . . . *electronically*.
4. Continuously Records Baume of Thin Liquor Feed.
5. Automatically Scans and Records Temperatures throughout the entire Evaporator . . . *electronically*.
6. Continuously Records Thick and Thin Liquor Storage Tank Levels.
7. Automatically diverts condensate if it shows evidence of contamination.

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You can see Wood's quality . . . it is evident at a glance. But long-time users everywhere will tell you that Wood's products for power transmission stand up under hard usage . . . demonstrating that Wood's quality is not the surface kind that wears off, but the built-in type that lasts and lasts . . . For 89 years, Wood's have been serving industry faithfully and efficiently.

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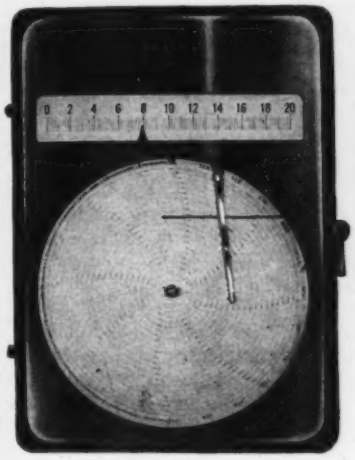
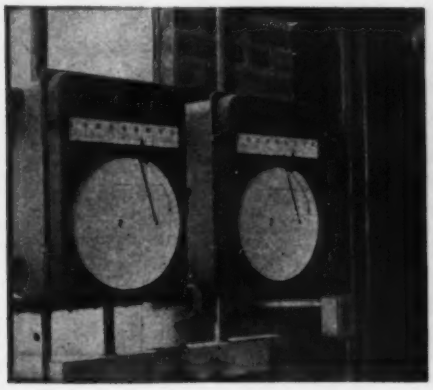
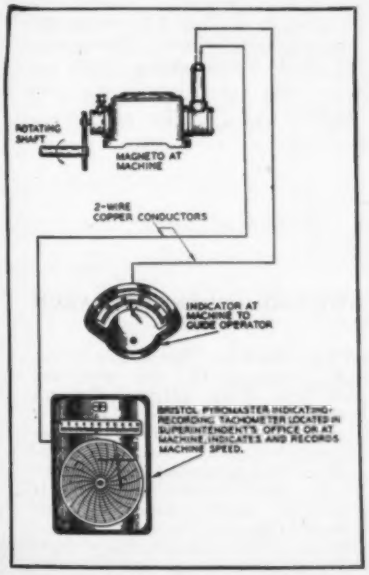
How Bristol's Pyromaster Tachometers Report Changes in Paper Travel Speed

Instantly and Accurately...Electrically





Two Bristol Pyromaster Tachometers keeping tabs on machine speeds in a Massachusetts mill. Notice how the magneto is V-belt-connected to one of the rolls.


ROTATING SHAFT
MAGNETO AT MACHINE
2-WIRE COPPER CONDUCTORS
INDICATOR AT MACHINE TO GUIDE OPERATOR
BRISTOL PYROMASTER INDICATING-RECORDING TACHOMETER LOCATED IN SUPERINTENDENT'S OFFICE OR AT MACHINE, INDICATES AND RECORDS MACHINE SPEED.

Some paper mills install an indicating tachometer at the machine to guide operator and a recorder in superintendent's office for permanent records. Other mills rely on one Indicating-Recording Pyromaster Tachometer mounted close to the machine.

Bristol's Indicating - Recording Pyromaster Tachometer responds instantly to changes in machine speeds as reported by the heavy-duty Model 44 Magneto which generates voltage directly proportional to the speed. The sensitive recording mechanism — unaffected by vibration — moves only when the galvanometer responds to a speed change. That reduces wear of moving parts to the minimum.

With no mechanical connection between galvanometer and the other units, the galvanometer, potentiometer unit and potentiometer relays are housed in separate gasketed cases for protection against dust and air currents when the instrument door is open.

All parts are accessible with the instrument in full operation. Dial and recording mechanism are mounted on the front of a hinged panel, with slide wire and potentiometer mechanism on the back. Each part can be serviced without disturbing any other part. No lubrication is ever required.

Other features of Bristol's Pyromaster Tachometer are fully described in Bulletin S1400. Address THE BRISTOL COMPANY, 148 Bristol Road, Waterbury 91, Conn., (The Bristol Co. of Canada, Ltd., Toronto, Ont. Bristol's Instrument Co., Ltd., London, N.W. 10, England.) West Coast: *Branch Factory* — 40 Berry St., San Francisco 7, Calif. *Branch Office* — White Building, Seattle 1, Washington, Lake Region: *Branch Factory & Office*—351 East Ohio St., Chicago 11, Ill. Southern States: *Branch Office* — Comer Building, Birmingham 3, Alabama.

Engineers process control for better products and profits

AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

neighbors or friends feel sure their selection was better than yours.

Many firms have found it difficult to choose between the power lift truck that works with skid platforms and the model that is designed to handle pallets. Rather than get along without both it would pay to toss up a coin and pick either blindly, providing it was clearly proven that both systems would be superior to the methods then in use. It is possible that a combination of the two would prove to be wise and there are plenty of cases where three or four makes of trucks are operated successfully in a plant. There is a gain in standardizing one one make of equipment, but there is nothing to prevent a firm from shifting to another make if conditions justify it.

The returns from a piece of equipment will vary in different mills. Much depends on the care that is used in selecting and training the operators. A really skilled operator may move 30 per cent more tonnage than a mediocre driver. The more costly or more intricate device requires and deserves more care than others in the selection of operators in their training.

One point that is overlooked in the beginning by some firms is arranging for prompt service when it is needed. That's why the manufacturers of equipment, who have reached the top, find they are getting the bulk of their orders. They are prepared to give service promptly because they are able to build a large and efficient organization due to their many installations.

Even the best designed and most carefully devised device will need replacement of parts as time goes on. It is possible to learn from the manufacturers what parts are likely to be needed. An investment in spare parts at the time the equipment is purchased is good business even if it is necessary to spend a good sum. The risk is not great for if time proves some of the parts will not be needed it is possible to trade them in with little loss for those parts that have been found necessary.

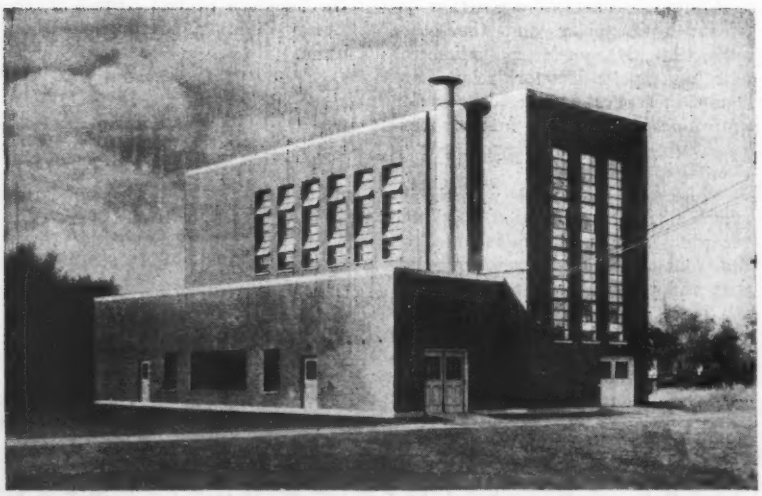
Let us assume that a breakdown of an important piece of equipment keeps it idle for a single day and a cost of $100.00 is charged against the breakdown because it means that much additional expense to get the same amount of work done. Perhaps overtime work is necessary and additional manpower needed to keep production rolling without interruption. A plant could have $2,000 invested in a stock of parts for two years and the interest at 5% on that amount would equal only that $100.00 cost. Unfortunately breakdowns can't always be cleared up in 24 hours, especially if parts needed are not stocked. If a shipment from the manufacturer's plant, probably 500 miles away, must be awaited, it may be a week's tie-up depending on how good an expediting job is done.

Where it is found impossible because of lack of manpower to pitch in and do the work of the disabled machine fully then they'll have to worry about a larger loss, a reduction in production with possibly the output of ten to fifty workers affected. An experience of that kind just once will soon sell the management on getting in an ample stock of parts as soon as it can be accomplished.

It has been demonstrated that larger paper mills have been justified in taking further precautions. They have invested in one or two additional pieces of equipment beyond their apparent need to take care of emergencies. These units may be idle a good part of the working day but they are ready when the urgent call comes and production continues at a fast pace without anyone being aware that some equipment is in the repair shop.

Next to having spare units to put into service is the policy of having skilled mechanics who have received special training in the maintenance of the devices. This training is usually given in the factory where the product is built and the training period may range from one week to a month. Only those who have experienced the anguish of seeing their valuable trucks tied up fo rseveral days or more because their mechanics were unable to solve the repair problem—only those executives realize that the investment in the training of the men pays definitely.

It isn't necessary to be a confirmed pessimist and always worrying about a breakdown, but it is smart business to realize that trouble is bound to occur and to plan to be ready for it at all times. The unprepared may be lucky enough to get along nicely usually but the luck won't last even though the very best equipment has been bought. Under any conditions preparedness pays and in a big way.



SWENSON OPENS RESEARCH LAB.

The Swenson Evaporator Company, Harvey, Ill., has completed this new Spray Dryer Research Building which houses what is claimed to be the world's most advanced spray dryer research facilities.

The new Swenson Gray-Jensen spray dryer research equipment is ready for experimentation with any pumpable and dryable substance. Operation of this commercial-size dryer will give production data under plant-scale conditions. These data, plus Swenson's fifty years of experience in process engineering, will assist prospective customers in the evaluation of the use of spray drying, as well as provide factors for the design of equipment.

PYRIDOSE effectively and economically controls paper mill slime. It starts to work at once.

PYRIDOSE is more rapidly effective because its active ingredient is 140 times more soluble than other comparable agents. It is *deadly to common slime-forming organisms, in concentrations of as little as 1 part per million.*

A handy one-ounce packet of Pyridose—thrown unopened into the beaters or refiners—starts the treatment immediately.

No stopping of machines . . . no waste of material. More information from your nearest Mallinckrodt office today.

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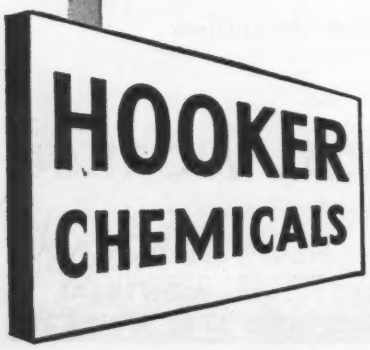
Why pH is Important to Your Bleachery Operations

Pulp and paper makers have learned that pH is not just a theoretical term, but is of practical importance in many phases of processing. It is of particular significance in bleachery operations. The relation of pH to economical and efficient operation is discussed in Hooker Bulletin No. 236, "Importance of pH and Catalysts in Bleachery Operations."

How chlorine, probably your most important chemical, can be used to the best advantage, how its diverse reactions can be controlled by variation of the pH value of the solutions, are fully treated in this Bulletin.

The importance of pH in making bleach liquor, pH and the composition of chlorine solutions, pH in the chlorination stage, in semi-bleaching kraft, in washing pulps, the effect of metal equipment, are some of the paragraph headings. Even if you are interested in only one of these items, it will repay you to have a copy of this Bulletin. A request on your business letterhead will bring it to you. And if the chemical problems that you are encountering are not covered by this or the other Hooker Bulletins, perhaps Hooker's Technical Staff can be of assistance. Their experience gained in working with pulp and paper mills over a long period of years is available to you whenever desired.

You who are not yet using Hooker Chlorine, Caustic Soda, Bleaching Powder and the other Hooker chemicals for the pulp and paper industry have yet to experience the assurance of smooth operation that comes from knowing that each shipment of chemicals is of the same uniform high purity as the previous one. For continued high quality chemicals specify Hooker.



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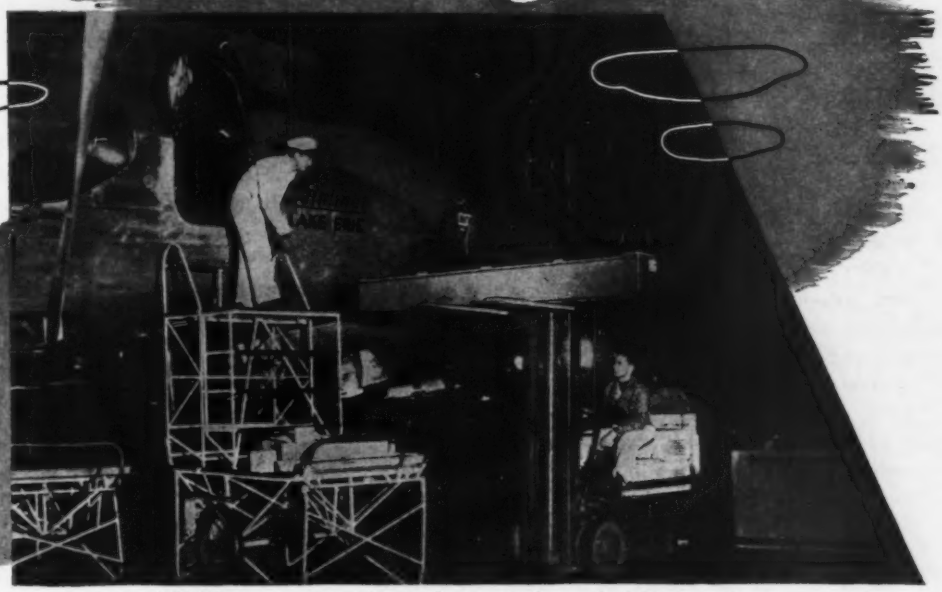
LINDSAY "Wires" Assistance



"Neither snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds."

A paper manufacturer had met with an emergency. There could be no alternative: a new Fourdrinier wire *had* to be in his plant as speedily as possible . . . Lindsay took to the air. The answer to the situation flashed off through the night. The next morning saw the exigency gone. The Lindsay organization "gets a real bang" out of being able to render assistance when the need arises.

THE LINDSAY WIRE WEAVING COMPANY
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CLEVELAND 10, OHIO

Lindsay WIRES
FOR PAPER MILLS

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

W. L. Cook, Editor

Building to Make More Paper

It came to many as something of a shock to hear E. W. Tinker, in his testimony at a hearing in Washington last week, to estimate that the current year's production of paper and paper board would pass 19 million tons. If that goal be reached it will represent a jump in production of nearly fifty per cent above the mark set by 1939. But such an estimate, based on his intimate knowledge of production rates and capacities serves as a natural introduction to understanding of other considered estimates that have been sent lately among the manufacturing end of the industry by the American Paper and Pulp Association that, counting this year's work, and that of the next two years, the capacity of the mills will be raised by about three more million tons at the end of 1948.

Of this increase it is forecast that about forty per cent will have been added to the mills during the present year. Fifty per cent is scheduled for 1947, and at present another half-million tons of capacity is expected to be completed and ready for operation by 1948.

Even if it were to be accomplished without interruption and smoothly such a program would merit the deep respect that must be accorded always to those who go ahead. In a postwar era when plants of other industries are being reconverted still, and when the War Assets Administration is striving mightily to find customers for some of the still idle capacity that hangs over from the war, the pulp and paper industry appears to be one group that can be counted on to start things going, not only with its own production rate but with its requirements for new building, for new machinery, and for modernizing existing equipment.

But it is not being accomplished without daily struggles. A file of testimony to this effect is to be found in letters that tell of plans still under development, of work started far behind schedule because of materials shortages in other industries. Privately, some operators declare, any figures that they could supply as to future outputs and the date when current plans may be put into effect, must always be mingled with a considerable amount of prayer.

It must be understood that several times three millions tons is easy to guess as the increment of three postwar years if every story that is passed around could be taken for gospel truth. Probably everyone in the paper business has heard of one or more projects that are in the under-wraps stage and very hush-hush. Fortunately much of this is easy to label as wishful thinking; more often than not it involves a combination of some one who is reputed to have millions to spend, or knows where to get them, and a man who knows enough of paper mill operations to sell himself a prospect of great things to be done.

Actually it must be considered, the program is probably to be regarded as conservative. Too many now at the head of paper enterprises recall how recently it was that there was plenty of idle capacity, and they still speak of the high cost of inventories when a market begins to shrink. It should be noted that this expansion of capacity has been undertaken and is being carried through with an amount of financing that is considered well on the conservative side by many who recall the energetic promotions of the decade that followed World War I.

In the amount of planning that now lies on the desks of paper mill men some shifting of emphasis is to be discovered. Paperboard and building papers account for more than forty per cent of the projected new capacity. Book and magazine paper is second in importance with almost twenty per cent.

As is always the case with week-to-week news in a rapidly moving period of industrial history, these figures are to be examined again, and evaluated after they have ceased to be predictions. By that time, it is likely, they will be amended and expanded upon, just as the mills and the projects which furnish the subjects of news this week will, themselves, fit into a larger picture of the pulp and paper industry a year or two years hence.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1946		Corresponding Weeks—1945	
October 19	105.1	October 20	96.5
October 26	106.8	October 27	95.8
November 2	107.2	November 3	97.5
November 9	106.8	November 10	97.0
November 16	104.9	November 17	96.4
November 23	*106.6*	November 24	91.4

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	90.2	95.9	95.5	91.0	89.7
1946	94.7	98.4	104.4	102.7	100.7	104.6	94.0	104.7	101.3	*106.4*			

COMPARATIVE YEARLY SUMMARIES

	1939	1940	1941	1942	1943	1944	1945	1946
Year to Date	82.6	86.0	97.0	91.5	87.6	88.5	89.5	*101.4*
Year Average	83.4	85.6	97.4	90.4	87.8	88.1	89.7	

PAPERBOARD OPERATING RATIOS†

Current Weeks—1946		Corresponding Weeks—1945	
October 19	98	October 20	96
October 26	101	October 27	98
November 2	100	November 3	97
November 9	102	November 10	97
November 16	101	November 17	95
November 23	*100*	November 24	91

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1945	91	95	97	97	96	96	86	90	91	97	95	85	93
1946	90	97	100	99	94	97	89	99	96	*100*			

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Problems to Meet —and Overcome

An editorial by P. H. Glatfelter
The P. H. Glatfelter Company

There were times, in the last five years, when obstacles arose in the paper industry which seemed insurmountable. However, history will record a fine record for the industry. They met all obstacles and overcame them. Production went on without paper shortage causing any undue hardship. The fact that we could overcome all the difficulties of the past five years should be proof to all that the present day problems can be met and overcome. They must be met, however, with the same zeal and determination with which we tackled and solved our past problems.

We are now moving through a period of "let down" or "ease off." This condition is due to the fact that too much hope was built on the theory that when our service men returned to civilian life, the labor shortage would be eased to the extent that raw materials would again be available in abundance. Basically this is true; but, it is not coming about as rapidly as we had hoped and will not improve materially until we tackle the problem with a determination to solve it.

Thousands of the young men were taken out of the mills of the paper industry and the mills that supply raw materials. They are back now and are being retrained but even with the most efficient training methods it takes months to get them back to the efficiency they had before their absence of two to four years. The new men who have now come into the industry must be trained from the beginning. The speed and efficiency of this training will have a direct bearing on the availability of raw material and consequently production of paper.

All the raw materials we need are here. With the proper training and placing of men and a workable public relations plan, half of our problem is solved. The other half is in the preservation and coordination of the production of these materials to meet the present and future demands.

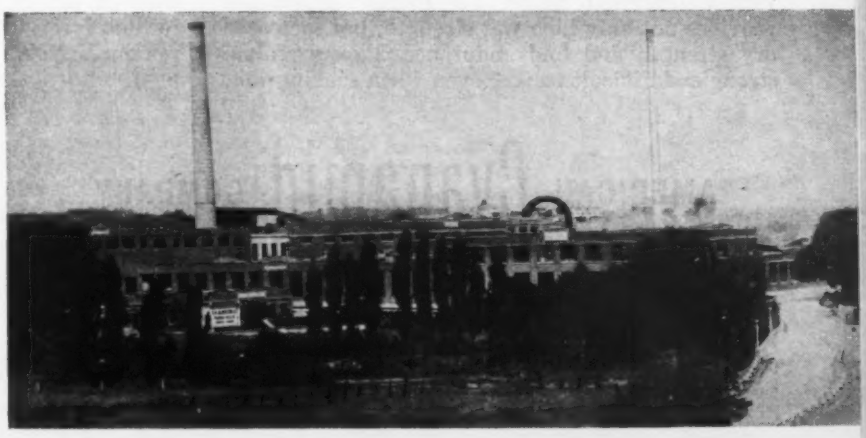
The past five year period has brought about a change in the industry's public relations. Prior to that period the industry was more or less taken for granted. With the nationwide advertising for saving waste paper and the importance of cutting pulpwood, the general public realized that paper was playing an indispensable part in the life of the nation. It will play just as an important part in normal times. It is self evident then that we must find ways to keep the industry before the public so that it will enjoy its rightful place among all industry in the country.

The general outlook for the whole paper industry looks very good to me. I have every confidence that the labor-management problems will be met and dealt with to the satisfaction of all.

Another problem for the future good of the industry is the program by the American Forest Products Industries, Inc., who are seeking coordination of education and action in forests by both wood producers and wood users. The program of growing trees as a crop is our only hope of preserving our forests and woodlands, hence we must protect our main source of raw material or pulpwood. The program has been enthusiastically received by printers, publishers and everyone depending on the paper industry for its products.

I believe that the next decade will bring about completely new designs of equipment and new and better production methods. Whatever changes are made, I know that the paper industry is capable of taking things in its stride and will continue to hold its high rank in the industrial groups of the world.

Home of the P. H. Glatfelter Company at Spring Grove, Pa.



A PERMANENT NEW PART OF THE HOUSEHOLD PICTURE...

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WINDOW SHADES
TABLE CLOTHS
AND NAPKINS
WALL PAPER
PAPER TOWELS

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Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY
122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Method For Evaluating The Fungicidal Properties of Treated Paper And Paperboard*

By B. F. Shema[1]

Abstract

A method for evaluating the fungicidal properties of paper and paperboard using Chaetomium globosum *or* Aspergillus niger *as test organisms is presented.*

Prior to and especially during the period of hostilities much emphasis was given to "mildew resistance" or the fungicidal properties of treated papers. In the past few years many methods have been suggested and used. The early procedures were incomplete and often quite tedious. For example: one method gave quite thorough instructions as to preparation of the test sample, and the methods of inoculation and incubation, but failed to mention the test organism. Another method was essentially the same as above but it was necessary to incubate the test specimen on a definite aged culture (the test specimen being placed on the culture when the sporangia were just developing). This oftentimes demanded very close observation and should require a highly skilled technician. Also, after a period of time, the test samples were removed from the mycelial mat and hung in a cabinet at a definite temperature and humidity. A more recent method suggests that the test sample remain on the mycelial mat throughout the incubation period, although in one section of this method it is recommended that the test specimens be sterilized in an autoclave at 15 p.s.i. (121° C.) for 1 hour. This, in the majority of cases, would greatly reduce the fungicidal properties of the toxicant.

It is hoped that the following method will give the industry a uniform method of determining the fungicidal efficiency of treated paper or paperboard. The method is simple, requires a minimum amount of equipment, and does not require great skill on the part of the technician. In many respects it is the same as that used for determining the fungicidal efficiency of textiles.

Preparation of Sample

Two-inch squares are cut from the test sample, the number of squares cut being determined by the number of tests desired; however, each sample should be tested at least three times. Suitable controls should always be included.

Culture Medium

The culture medium should be composed as follows:

Tap water	1000.0 ml.
NH_4NO_3	3.0 g.
K_2HPO_4	1.0 g.
KCl	0.25 g.
$MgSO_4$	0.25 g.
Agar	10.0 g.

The pH is adjusted to 6.8 to 7.0 with sodium hydroxide or hydrochloric acid.

Melt the medium in an Arnold sterilizer, steam bath, or over a flame, distribute into screw-cap bottles or, if the medium is to be used immediately after sterilization, into flasks. Sterilize at 15 pounds pressure (120° C.) for 20 minutes. After sterilization, allow the medium to cool and pour approximately 25 ml. into a 100-mm. Petri dish. Allow to harden. Place the 2-inch square of paper on the surface of the agar.

Inoculation and Inoculum

In an 8-ounce screw-cap bottle containing about 0.5 to 0.75 inch of glass beads place a disk of filter paper (cut in four sections) and approximately 20 ml. of nutrient salt medium (just enough to cover the beads). The nutrient medium should be composed of the following:

Tap water	1000.0 ml.
NH_4NO_3	3.0 g.
K_2HPO_4	1.0 g.
KCl	0.25 g.
$MgSO_4$	0.25 g.

The pH is adjusted to 6.8 to 7.0 with sodium hydroxide or hydrochloric acid.

Sterilize the bottle at 15 pounds pressure (121° C.) for 20 minutes, cool, inoculate with *Chaetomium globosum*, and incubate for 14 days at 26 to 30° C. At the end of this period, the filter paper should be quite uniformly covered with the fruiting bodies of the organism. Shake the bottle until the fruiting bodies are well dispersed, add about 50 ml. of sterile nutrient salt broth, and shake until the mycelium and spores are in a uniform suspension.

Essentially the same procedure is used when *Asper-*

* To be presented by title at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Commodore Hotel, New York, February 24-27, 1947.

* This work was carried out under contract with the Office of Quartermaster General (W44-109-QM 305-QMC 44) and is published by permission of the National Research Council and the Office of Quartermaster General.

[1] Research Assistant, The Institute of Paper Chemistry, Appleton, Wis.

gillus niger is the test organism, the only difference being in growing the necessary inoculum. The agar bottle slant is prepared by sterilizing approximately 30 ml. of 2% malt agar in an 8-ounce screw-cap bottle. The slant is prepared by placing the bottle in a horizontal position after sterilization. After cooling, the surface is inoculated with 1 ml. of a spore suspension of *Aspergillus niger*. This is allowed to incubate for 10 days, after which time the surface should be covered with the fruiting bodies of the organism. The inoculum is prepared by suspending the spores in 50 ml. of the nutrient salt broth.

By means of a wide-mouth pipe, distribute 1 ml. of this suspension over the surface of the paper sample. This is incubated for 2 or 3 weeks at 26 to 30° C. The effectiveness of the treatment is determined by visual examination. At the end of this incubation period, the paper samples should be covered with a more or less even coating of *Chaetomium globosum*. The treated samples, depending upon the efficiency of the treatment, may have varying amounts of growth of the test organism. However, other fungi may grow in the absence of *Chaetomium globosum*. All samples are reported as relative growth or absence of *Chaetomium globosum*, although the growths of others should be noted.

Any sample that supports growth of the test organism shall be unsatisfactory; however, in the case of treated samples, no growth may be observed on the surface but will be quite prolific along the cut edges. These cases will be considered as satisfactory treatment, because there was no growth on the surface of the test specimen.

Experimental Results

The above method has been applied to over seventy samples received from various sources; these included papers and board impregnated with different disinfectants and those coated with cellulose acetate and casein containing a disinfectant.

In those cases where the paper or the coating contained a mercury compound, experimental results showed that *Aspergillus niger* was the more resistant organism; in all other cases and, especially with the chlorinated phenols, the results were essentially the same for both organisms.

Modern Plastics

John Wiley & Sons have recently published "Modern Plastics" by Harry Barron, head of the plastics department of the Pirelli-General Cable Works, Ltd. (680 pp. 5⅝ by 8¼, 250 illustrations). This book is not written for experts and was first printed in England in 1945 for the purpose of encouraging a large number of men with some technical background to quickly acquire a foundation in plastics technology so that they might enter this field and contribute to the necessary wartime developments.

Although there is sufficient chemical terminology used to properly describe the various plastics and their preparation it is not necessary to be a chemist to obtain a great amount of information from this book. The major sections of the book include: raw materials, thermosetting resins and their plastics (phenol, urea, and melamine resins) cellulose plastics, vinyl plastics, and other plastics.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $7.50 per copy.

New TAPPI Members

The executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Pierre Avot, President, Les Etablissement Avot Vallee, Blendecques (Pas de Calais), France, a 1929 graduate of the University of Lille, France. He has been with his present company since graduation.

James Buglass, Chief Chemist, Durham Paper Mills Ltd., West Hartlepool, County Durham, England. He was formerly employed by Gemmell & Thin, Edinburgh, Scotland; and Westfield Paper Co. Ltd., Bathgate, England.

Germano Centola, Director of the Stazione Sperimentale per la Cellulosa, Carta e Fibre Tessili Vegetali ed Artificiali, Milano, Italy, a graduate of the Universita di Bologna. He was formerly employed by the Universita di Bologna, Bologna, Italy; and the Universita di Roma, Roma, Italy.

Alexis Failliot, Manager, Papeteries de Pont Auderner, Paris, France, a 1934 graduate of Hautes Etudes Commerciales. He has been with his present company since graduation.

Louis P. Hershey, Owner, Louis P. Hershey Co., Des Plaines, Illinois. He was formerly employed by the Interstate Folding Box Co., Middletown, Ohio; the U. S. Printing & Lithographing Co., Cincinnati, Ohio; and the Harlich Manufacturing Co., Chicago, Illinois.

Colbert W. Wilkins, Chief Chemist, Bedford Pulp & Paper Co., Big Island, Virginia, a 1933 graduate of the University of Florida. He was formerly employed by the Florida Mapping Project, Gainesville, Florida; the Southern Kraft Corp., Georgetown, South Carolina; and the National Container Co., Jacksonville, Florida.

Richard S. Hunter, Physicist, H. A. Gardner Laboratory, Bethesda, Maryland, a 1937 graduate of George Washington University. He was formerly employed by the National Bureau of Standards, Washington, D. C.

Donald G. Knight, Salesman, Bulkley, Dunton Pulp Co., Inc., Kalamazoo, Michigan, a 1941 graduate of Dartmouth College. He took a summer course in pulp and paper technology at the University of Maine, Orono, Maine, and a course in graduate marketing at Columbia University.

Heinz H. Loeffler, President, Kupfer Bros. Paper Co., Chicago, Illinois, a graduate of Ecole Superieure de Commerce, Switzerland. He was formerly employed by Wilhelm Stern Co., Nuernberg, Germany, and by Kupfer Bros. Company, New York, N. Y.

James H. Martindale, Assistant to Chief Engineer, Shartle Bros. Machine Co., Middletown, Ohio. He attended the University of Virginia. He has been with his present company since 1941.

George H. Rand, Jr., Assistant Manager, International Paper Co., Niagara Falls, New York, a 1929 graduate of Bowdoin College. He has been with his present company since graduation.

David F. O. Russell, Director, Tullis, Russell & Co. Ltd., Markfinch, Fife, Scotland, a graduate of St. Andrews University. He has been with his present company three years, having served two years before World War II and one year since.

Arthur J. Weiss, Plant Engineer, Lowe Paper Co., Ridgefield, New Jersey, a 1921 graduate of the University of California. He was formerly employed by the Westinghouse Electric Corp., Philadelphia, Pennsylvania.

The Manufacture of Viscose from Sugar Maple*

Acer saccharum, Marshall

By C. W. Tasker[1] and C. E. Libby[2]

Abstract

In an attempt to prepare viscose grade pulp from sugar maple by the sulphate process, pulps were produced with relative ease but they were universally high in pentosan content. The per cent pentosans ranged from 17 to 18%. This pentosan content could not be reduced by varying the cooking time from 2 to 5.5 hours, nor by varying the cooking temperature employed from 165 to 175°C., all other cooking conditions being constant.

The pentosan content of the sulphate pulps was materially reduced by an acid hydrolysis - alkaline extraction refining process. The best refined pulps had a pentosan content of from 3 to 6%. In the acid hydrolysis stage of this process the temperature was the most important variable; the amount of acid used and the length of hydrolysis treatment followed in order. The optimum acid treatment conditions were temperature 90°C., 20% hydrochloric acid based on pulp weight, 2 hours reaction time, and 5% pulp consistency. In the alkaline extraction stage of the process the quantity of chemical employed was the most important variable. The optimum alkali extraction conditions were found to be 100% sodium hydroxide based on the pulp weight, 2 hours reaction time at a temperature of 0°C., and a pulp consistency of 10%.

The refined pulp made by this investigation, after a single stage hypochlorite bleach, gave a product which compared favorably with commercial softwood and hardwood sulphite pulps generally used by the viscose industry.

Until recently the coniferous woods have occupied an undisputed place of preference as a raw material for the pulp and paper manufacturing industries. There were well founded reasons, both economical and technical, for this preference which have been pointed out by Richter *(1)* and Running *(2)*. However, as the demands of the industry grew, it became apparent that its supply of coniferous pulpwood was gradually diminishing. The industry in New York State, for instance, found as early as 1904 that it was importing 40% of its total pulpwood needs. In the year 1940, however, the imports amounted to 64% of its total needs as recorded by Catherwood *(3)* and Clapp *(4)*.

A survey conducted by New York State in 1920 disclosed that there were 15 million cords of hardwoods, birch, beech, and maple, available in the State while only 6.9 million cords of spruce and fir were available as shown by Clapp *(4)* and Bullock *(5)*. The growing preponderance of hardwood has been reflected throughout the entire nation. Bray and Chidester *(6)* and Crocker *(7)* have shown that, except for the Pacific Northwest area, hardwoods have been found to occupy more than 50% of the entire United States forest land. Besides the more adequate supply of hardwoods, McMichael and McInnis *(8)*, and Hoyle *(9)* have pointed out other advantages which indicate that they will be increasingly used in the future.

Various investigators, Richter *(1)*, Bray and Chidester *(6)*, Brown *(10)*, Sutermeister *(11)*, Curran, *(12)*, Carpenter and McCall *(13)*, Curran *(14)*. Klauditz *(15)* and Hill *(16)*, in the past have proven that hardwoods, including sugar maple, could be pulped satisfactorily by the sulphite process. These pulps were suitable for conversion to paper and when refined in the standard ways were suitable for conversion to cellulose derivatives. Pulps made by the sulphate process on the other hand, while suitable for paper, were not found to be satisfactory for the preparation of cellulose derivatives. Carpenter and McCall *(13)* found they contained a large quantity of pentosans. These pentosans consumed an excessive amount of chemical in the derivative preparation and tended to cause the ultimate product to be unstable.

Therefore, the objective of this investigation was to study the preparation and refining of sugar maple sulphate pulps to produce a product that could be used for making cellulose derivatives. In view of the fact that the viscose industry alone uses large amounts of high alpha-cellulose (300 million pounds during the first three-quarters of 1943 according to Rogers *(17)*), the purpose of this investigation was further directed at the production of a pulp that might be suitable for the viscose industry.

Application of the Sulphate Process to Hardwoods

Perhaps one of the earliest investigators to apply the well known pulping processes to hardwoods was Emil Heuser *(18)*. He found that the alkaline processes when used on beech wood gave pulps that could be bleached rather easily. The sulphate pulps were by far the easier bleaching and stronger physically when compared with soda pulps made under similar conditions. Apparently, the addition of sodium sulphide altered the cooking reactions so that less coloring matter remained behind in the washed pulp, and so that the alkali had less drastic action on the cellulose. From a study of cooking pressures and cooking temperatures, it was concluded that increasing cooking pressure up to 135 p.s.i., or increasing the cooking temperature up to 175° C. gave pulps with lower bleach requirements. Pulp yield and strength characteristics were found to decrease under the same change in conditions after having passed through an optimum point.

Bray and Anderson *(19)* used aspen wood in an investigation of the chemical changes that occurred in

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* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.

An abstract of a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at the New York State College of Forestry, Syracuse, N. Y.

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[2] Member of TAPPI; Professor of Pulp & Paper Manufacture, New York State College of Forestry, Syracuse, N. Y.

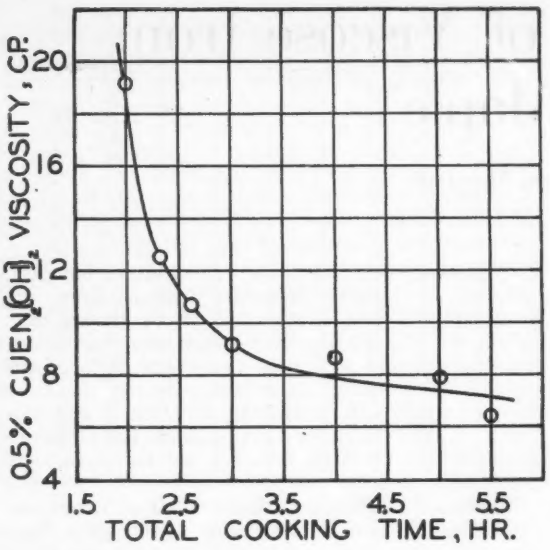

FIG. 1
The Effect of Cooking Time on Pulp Viscosity

wood during the alkaline pulping processes. It was found that under the conditions used the greatest chemical change took place during the first 2 hours of the cook. The cellulose decomposed at a greater rate than the lignin during the first 0.5 hour. Then the lignin was decomposed at a greater rate during the second 0.5 hour. After a period of about 2 hours the situation reversed itself again and the cellulose was attacked. Similarly other investigators (Cable *(20)* and Shikata *et al. (21)* found that short cooks of from 2 to 4 hours in duration were as satisfactory as long cooks. In fact poplar pulped by a 2-hour alkaline process was found to be suitable for the manufacture of rayon after the proper refining treatments. In general, it was found that regardless of the duration or maximum temperature of an alkaline cook, the hardwood pulps still contained large amounts of pentosans.

Hotin Den *(22)* in a study made on one of the birches found that, regardless of the amount of chemical used in the alkaline process, the resulting pulp contained appreciable amounts of pentosans. One cook was made in which 30% chemical was used and the resulting pulp contained only 3% pentosans. However, under this drastic condition the alpha-cellulose content and viscosity were lowered to undesirable levels. Maple and other hardwoods cooked with a total of 22% chemical, based on the weight of moisture-free wood used, gave good pulps as far as alpha-cellulose and other chemical characteristics were concerned, except for the pentosans. The cooking temperature was 175° C. and the cooking pressure 115 p.s.i. The cooks made with 20% total chemical or less were all raw and contained large amounts of shives. The results of other work (by Carpenter *(13)* and Klauditz *(15)*) indicated that while soft cooked sulphate pulps were satisfactory in all other properties they contained too much pentosans to be acceptable as a pulp that could be used in cellulose derivatives. Consequently, it was suggested by one investigator that the wood should have been pretreated in some manner to facilitate the pentosan removal.

Richter *(23, 24)* was one of the first investigators to use precooking treatments for the production of high alpha-cellulose from hardwood sulphate pulps. The woods, maple and birch, were first cooked in water at elevated temperatures and pressures, and then were given a typical sulphate pulping treatment with liquor consisting of sodium hydroxide and sodium sulphide. In the high temperature water treatment certain organic acids were liberated from the pulp which acted upon the pentosans in such a manner that they became soluble in the following alkaline cook. Another process consisted of treating the wood chips with mineral acid solutions at high temperatures and pressures for periods up to 3 hours. These chips were then given a typical sulphate pulping treatment. The function of the mineral acids was to degrade the pentosans to such a point that they would be soluble in the following alkaline cook. Richter found that these pulps had high alpha-cellulose contents, low solution viscosities, and relatively low pentosan contents. Pentosan contents ranging between 3 and 5% were reported.

Many other investigators, Jayme and Schorning *(25)*, Correns and Schorning *(26)*, Cornell and Montonna *(27)* also reported that pretreating hardwoods rich in pentosans with mineral acids under various conditions of temperature, pressure, and time made it possible to manufacture pulp by the sulphate process, which was low in pentosans and suitable for conversion to cellulose derivatives. A typical example as given by Jayme *(28)* consisted of the following treatment: chips were digested with 20% sulphuric acid at temperatures ranging from 70° to 80° C. for 2 hours. The chips were then given a sulphate cook in which the liquor ratio (chip weight to liquor weight) was 1/4.75, and in which the 3% sodium in the liquor was distributed as follows: 80% as sodium hydroxide, 5% as sodium carbonate, and 15% as sodium sulphide. The maximum cooking temperature was 170 to 180° C. depending on whether 70 or 80° C. had been used in the acid pretreatment. The total digestion time was 5.5 hours, of which 1.5 hours were required to reach the maximum temperature and 1 hour for relieving. Pulp in yields of 32 and 33%, containing 91 to 92% alpha-cellulose and pentosans in amounts less than 5% were consistently obtained. These pulps were readily bleached by the well known bleaching methods to a brightness that compared favorably with bleached sulphite pulps.

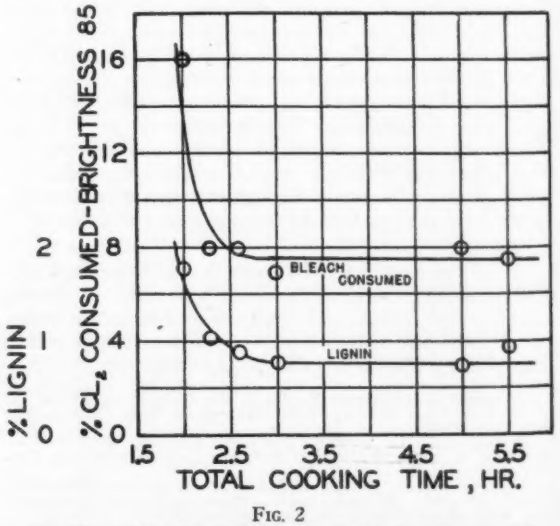

FIG. 2
The Effect of Cooking Time on Pulp Bleach Requirements and Lignin Content

The bleached pulps showed an alpha-cellulose content of from 91 to 92% and a pentosan content slightly higher than the unbleached pulp. These bleached pulps were found to give good viscose solutions.

Chemical Refining of Hardwood Sulphate Pulps

Richter *(29)* found that the chemical refining of hardwood sulphate pulps presented a difficult problem. Softwoods such as spruce and fir contained approximately 10% pentosans in comparison to about 20% in the case of hardwoods. When these different woods were pulped similarly by the sulphate process, the resulting pulps contained less pentosans but those made from the hardwoods still contained relatively larger amounts, even up to 20% in some cases. Sulphite pulping had a more selective action on pentosans and removed them much more completely. A hardwood sulphite pulp contained 10% or less pentosans.

According to Richter *(30)*, the pentosans found in sulphate pulps were different in character than those in sulphite pulps. They were likened to the alpha, beta, and gamma forms of cellulose, the alpha form being alkali resistant. Various means were set forth and tried out for refining sulphite hardwood pulps. A major change in cooking liquor composition often gave the desired results, but usually special treatments following the pulping operation were found to be necessary. Pulp extractions with dilute sodium hydroxide at elevated temperatures or extractions with concentrated solutions at low temperatures gave desired results. Also, it was found that prehydrolysis with hot chlorine water, mineral acids, or other oxidizing agents followed by caustic extractions did the work.

In the patent literature various hydrolysis treatments were considered for the specific purpose of eliminating pentosans from sulphate pulps prepared from any cellulosic raw material rich in pentosans. Richter *(31)* and Bayerl *(32)* claimed that pulps containing from 15 to 17% alkali resistant pentosans were treated with chlorine water solutions to hydrolyze the pentosans and were then extracted with alkali solutions. The amount of chlorine used varied from 2 to 8% based on the weight of the moisture-free pulp treated. The temperatures at which the hydrolysis was carried out ranged from 20 to 60°C., and the length of the treatments ran from 0.5 to 3 hours. In the alkali extractions that followed 5 to 18% caustic solutions were used, at pulp consistencies ranging from 5 to 10%. The temperatures of the extraction ran from 0 to 100°C., depending upon what concentration of caustic was used. The resulting pulps contained from 88 to 90% alpha-cellulose, from 2 to 5% pentosans and were easy bleaching. Cellulose derivatives prepared from them were of good color and stability.

Another method described by Richter *(33)* consisted of hydrolysis treatments using mineral acids, such as sulphuric, hydrochloric, and nitric. These acid hydrolysis treatments were again followed by alkaline extractions as described before. The amounts of mineral acid used ranged from 0.5 to 20%, based on the weight of dry pulp treated, and the temperatures used changed inversely with the amount of acid used. The pulps refined by such treatment were found to contain pentosans in amounts less than 5%. They were high alpha pulps and suitable for conversion to cellulose derivatives.

Still another of Richter's patents *(34)* claimed that oxidants, such as calcium hypochlorite, in amounts up to 10%, based on the weight of dry pulp treated, could be used in the presence of a mercerizing caustic solution to remove alkali resistant pentosans from pulp. The process was carried out at a temperature of 40°C. until all of the oxidant had been substantially consumed, then the temperature was lowered to 20°C. or lower. At lower temperatures the extraction action of the alkali was increased. After an extraction period of from 6 to 8 hours, a pulp of high alpha-cellulose content and low pentosan content was obtained.

TABLE I.—CHEMICAL CHARACTERISTICS OF A SUITABLE VISCOSE PULP

Alpha-cellulose, %	greater than 88.0
Organic solubles in alcohol benzene, %	less than 0.5
Pentosan content, %	less than 5.0
Ash content, %	less than 0.15
Lignin content, %	less than 0.10
Color (Higgins photo-electric colorimeter), %	greater than 85
Viscosity (by TAPPI Standard Method), cp.	1 to 25

Any of the processes discussed, besides removing pentosans and increasing the alpha-cellulose, helped to remove from a pulp other impurities that might have been present and to reduce its bleach requirements. From the results of various investigations by Esselen and Gurley *(35)*, Moore *(36, 37)*, Lundberg *(38)*, Helbs *(39)*, and Lindpainter *(40)*, a summary of the most important chemical characteristics of a suitable pulp for the viscose industry was assembled in Table I. It was found that the viscosity of a pulp could be any value from 1 to 25 centipoise as long as the pulp was uniform. In other words, the pulp should not contain part high viscosity and part low viscosity cellulose. A low viscosity pulp may even be preferred according to Richter *(41)* for conversion to viscose, for the length of time required to age alkali cellulose is directly proportional to the original pulp viscosity.

Refined hardwood sulphite cellulose according to Richter *(42)* compared favorably with softwood celluloses for the manufacture of viscose. In fact the time required by the alkali cellulose shredding process and the power consumed by it may be greatly reduced if hardwood pulp is used. Since the hardwood pulps are shorter fibered, the shredded alkali cellulose is more uniform and fluffy in character. This results in faster and more uniform aging, and in more uniform reaction with carbon disulphide in the xanthation. Hardwood pulp sheets, when steeped in mercerizing caustic are more tender and difficult to handle than softwood sheets as noted by Carpenter

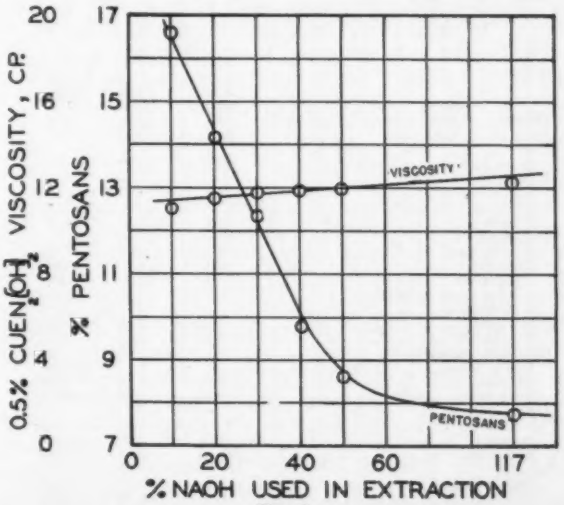

FIG. 3
The Effect of the Amount of NaOH Employed in the Alkaline Extraction on the Pulp Pentosan Content and Viscosity

and McCall *(43)*. However, with a little extra care the operation may be carried out successfully. Richter *(44)*, in relation to this problem, found that if the pulp was beaten for a short period before the sheets were made no trouble was encountered.

With this literature review and special reference to methods used for refining alkaline pulps in mind, laboratory work was initiated to ascertain if satisfactory hardwood sulphate pulps could be manufactured from sugar maple suitable for use in the viscose industry. Although the refining process which has been used is covered in the patent literature no work on the variables involved has ever been published.

Experimental Work

The experimental work in this investigation was confined to a study of sulphate pulping and a study of refining. The most desirable pulp produced was utilized in the refining study in an attempt to secure a pulp low in the undesirable pentosans and which would be suitable for conversion into viscose. In the pulping study work was limited to an investigation of cooking time and cooking temperature while all other variables were held constant. The refining work consisted of a study of a two stage process, this consisting of a hydrochloric acid hydrolysis stage followed by an alkaline extraction stage. Determination of the effects on the pentosan content and viscosity of the pulps manufactured were made varying the amounts of chemical employed in each stage, the length of time employed for each stage, and the temperature at which each was carried out.

Wood Employed in the Problem

Sugar maple *(Acer saccharum,* Marshall) was obtained from the State Ranger School of the New York State College of Forestry located at Wanakena, New York. The wood was chemically and physically examined and the results compared with similar analyses given in the literature by Richter *(1)* (see Table II). The methods followed for the wood analysis were those published by the U. S. Forest Products Laboratory *(45)*. The distinguishing differences in chemical composition between the sugar maple and the spruces are brought out. The maple had a higher pentosan content, a higher density, and a lower lignin content.

TABLE II.—COMPARISON OF THE CHEMICAL AND PHYSICAL PROPERTIES OF SUGAR MAPLE WITH ANALYSES OF WOOD REPORTED IN THE LITERATURE

	As Analyzed by G. A. Richter(*1*)		As Analyzed by Author
Analysis	Red Spruce	Sugar Maple	Sugar Maple
Diameter of trees (breast height), inches	8.6	7.6	18.7
Number of tree rings	83	97	190
Density, lb. of moisture-free wood in a cubic foot of green wood	25.2	34.4	37.3
Lignin, %			
Entire wood	...	...	21.5
Sapwood	28.4	23.4	20.6
Heartwood	29.8	26.6	26.6
Pentosans, %			
Entire wood	..	...	20.1
Sapwood	9.1	16.6	20.6
Heartwood	10.5	15.4	19.2
Alcohol-benzene solubles, %			
Entire wood	...	...	2.01
Sapwood	1.83	3.87	2.85
Heartwood	1.93	2.84	1.97
Hot water solubles, %			
Entire wood	...	...	2.83
Sapwood	2.52	0.34	3.31
Heartwood	3.89	2.09	2.11
Total solubles, %			
Entire wood	...	...	4.84
Sapwood	4.35	4.21	6.16
Heartwood	5.32	4.93	4.08
Ash, %			
Entire wood	...	...	0.35
Sapwood	0.31	0.24	0.25
Heartwood	0.64	0.73	0.62

Note: All percentages are based on moisture-free original wood.

Preparation of Wood for Cooking

The sugar maple wood was barked by hand and then cut into pieces small enough to fit the spout of a 24-inch laboratory wood chipper. The chips were made from complete sections of the log so that the chips contained the correct proportion of heartwood to sapwood. After chipping, the chips were passed over a laboratory chip screen and all sawdust and knots were rejected. This gave uniform chips approximately ⅝ inches long. The chips were then stored in air-tight containers until used.

Cooking Liquor Preparation

The cooking liquor used for the experimental pulping was made up from commercial flake caustic which analyzed approximately 99% sodium hydroxide, and from commercial fused sodium sulphide which analyzed approximately 60% sodium sulphide. Concentrated solutions of these chemicals were made up in large glass carboys and were allowed to stand until all suspended matter had settled out. The supernatant liquors were analyzed and their concentrations, expressed as sodium oxide, were noted. The total per cent chemical employed, the per cent sulphidity, the liquor concentration in grams per liter, and the liquor to wood ratio were kept constant for all cooks. Therefore, the correct amount of each concentrated solution was added to the calculated amount of water needed to make the proper liquor employed for each cook.

Method of Pulping

A stainless steel, stationary, upright digester, having a wood capacity of 10 pounds, was used in the pulping experiments. The top and the bottom of the digester were both removable. The digester had a complete heating system and liquor circulating pump. The liquor was heated indirectly through a stainless steel system consisting of a heat exchanger, pump, and piping. The oil heat exchanger was fed by high viscosity oil which was heated to the required temperature by gas burners. The temperature of the oil system was kept at 240°C. by a thermoregulator. A separate motor-driven pump circulated the hot oil through the heat exchanger. The following method of operation was employed:

Starting the Oil System. A small steam line connected around the oil circulating pump was turned on and allowed to heat the pump for about 15 minutes. The gas burners, which heated the oil were then turned on at low heat and the oil pump was started. The proper valve adjustments were first made so that the oil did not circulate through the liquor heat exchanger. The oil temperature was gradually brought up to 240°C.

Charging the Digester and Starting the Cook. Pulp gaskets were cut to fit the top and bottom flanges of the digester. The bottom cover was securely bolted on and all the valves on the liquor circulating pump and the liquor lines were closed. The weighed charge of wood chips was then put into the digester, and a stainless steel perforated plate was placed on top of the chips in the digester to prevent their floating when the liquor was introduced. The liquor was then added to the charge, and the digester top was securely bolted on. The relief valve was closed and the relief line was connected to the exhaust system. The liquor circulating pump was started.

The Cook. The oil regulating valve, which admitted the hot oil to the heat exchanger, was then opened, and the temperature raised according to a

predetermined schedule. With care it was possible to control these valves so as to follow any given temperature schedule to within ± 0.5°C. The temperature of the digester contents was observed by means of a long stem thermometer placed in a well situated in the side of the digester. As the temperature of the digester reached 100°C., the relief valve was cracked open until steam began to appear in the exhaust system. This procedure was followed to allow the air trapped in the digester to escape. The relief valve was then closed and the cook was completed. At the end of the cook the flow of oil through the heat exchanger was shut off and the pressure was relieved to zero. The hot water line was connected to the relief line and the valve on the bottom of the liquor circulating pump was opened so that the digester drained. After all the cooking liquor had drained out, hot water was circulated through the digester and its contents continuously until the effluent was clear.

Handling the Pulp. When washing of the pulp was completed in the digester, the top and bottom covers were removed and the pulp was placed in a disintegrating tank. Warm water was added to the tank and the pulp was agitated until disintegration was complete, after which it was drained through a cheese cloth and pressed out by means of a hand press.

The pressed pulp was then broken up by hand and mixed thoroughly. Triplicate moisture samples were taken after the net pulp weight had been determined. From this information the unscreened yield was obtained. The pressed pulp was then screened on a small laboratory screen equipped with a single 0.010 inch cut plate. The screenings were collected, oven dried, and weighed. From these data the per cent screenings was calculated. The screened pulp was again pressed out in the same manner as the unscreened pulp. The screened yield was determined by subtracting the weight of screenings from the weight of unscreened pulp. The pressed pulp was then broken up and spread out on a table to air dry. After it was dry, the pulp was placed in a large paper bag and stored for further use in refining experiments. A small air-dry sample was shredded in a laboratory Wiley mill for analytical purposes.

Methods Employed in Pulp Analysis

The pulps obtained by the sulphate pulping of sugar maple were analyzed for the following chemical and physical properties:

1. Yield and screenings (determined as previously described).
2. The per cent alcohol-benzene solubles.
3. The per cent ash.
4. The per cent lignin.
5. The per cent pentosans.
6. The per cent alpha cellulose.
7. The viscosity (0.5% $CuEn_3(OH)_2$).
8. The bleach requirements necessary to attain a brightness of 85% on the Higgins' Photo-Electric Colorimeter.

The methods employed for determining the above characteristics were those published by the Forest Products Laboratory, except in the cases of the viscosity and bleach requirements. The viscosity was determined by the cupriethylenediamine dispersion method as described by Straus and Levy *(46)*. The bleach requirements were determined by a single stage hypochlorite bleach method called the "Excess Chemical Method" as used at the Pulp and Paper Laboratory of the New York State College of Forestry. The method is described in full as follows:

Excess Chemical Method for Bleaching Requirements. A set of 5-gram samples (moisture-free) is weighed out accurately; at least five samples should be used, and more if the approximate bleach requirements are not known. These samples should be in a moist condition, and free from lumps which will not break up when the pulp is put into suspension. Each of the samples is placed in a 16-ounce bottle fitted with a rubber stopper. To each bottle a measured quantity of water is added so that the final volume is 100 ml., including the water in the pulp and bleach liquor. The bottle is shaken well, and all the pulp thoroughly disintegrated. Then the calculated amount of bleach liquor is added to each sample in amounts above and below the probable bleach requirement. If, for example, it is estimated that the pulp will require 10% of chlorine to obtain a satisfactory white color, then we would use 6, 8, 10, 12, and 14% chlorine in each of the samples. The calculated amounts of bleach liquor are carefully buretted into each bottle, and the latter is quickly placed in a constant temperature bath at 37°C. for 4 hours, shaking frequently. The samples are then removed from the bath, washed on a Buchner funnel until no chlorine remains in the pulp, and the washings titrated with 0.1 *N* sodium thiosulphate solution to determine the amount of residual chlorine. This is done by adding 10 ml. of concentrated acetic acid to the suction flask containing the washings, and an excess of 10% potassium iodide solution; then the liberated iodine is titrated with the thiosulphate solution to a starch end-point. The quantity of chlorine consumed is determined by deducting the amount of chlorine found in the washings by the back titration from the amount originally added to the sample. This is recorded as the per cent by weight on the basis of the original moisture-free weight of the pulp used. After the pulp is washed, two sheets are made on the British Standard sheet machine, and, after conditioning in the constant temperature and humidity room, these sheets are tested for brightness on the Higgins' Photo-Electric colorimeter.

Results of Experimental Cooking

The Effect of Varying the Total Cooking Time. The effects of varying the total cooking time, from 2 to 5.5 hours, on the various pulp characteristics are shown in Table III.

Cooks No. 8 and 8-A were duplicates; and cooks No. 3-A and 3-B were duplicates. It was thought best to reproduce these cooks as the total cooking time was extremely short. Since the pulp viscosity is very sensitive to changes in cooking conditions, it was used as a check on the reproducibility of these cooks. It was found that the cooks made with these short cooking schedules could be reproduced very closely.

TABLE III.—THE EFFECT OF TOTAL COOKING TIME ON PULP PROPERTIES

Constant Cooking Conditions

Total chemical as Na_2O used on the weight of moisture-free wood pulped, %	25
Sulphidity as Na_2O, %	33
Concentration of cooking liquor, g./l.	50
Liquor to wood weight ratio	5/1
Weight of moisture-free wood used per cook, g.	3,000
Maximum cooking temperature, °C.	175
Time to reach the maximum temperature, hr.	1.5
Time required at end of cook to drop pressure, hr.	0.5

Cook Number	8	8-A	3-A	3-B	7	4	5	6	7
Total cook time, hr.	2	2	2.3	2.3	2.6	3	4	5	5.5
Screenings, %	1.54	0.62	0.13	0.06	0.77	0.16	0.59	0.33	0.31
Screened yield, %	50.25	49.85	47.75	47.85	48.80	48.34	47.20	46.94	47.50
Alcohol-benzene solubility, %	0.39	...	...	0.52	0.38	0.28	0.37	0.43	0.37
Ash, %	0.46	...	...	0.35	0.41	0.32	0.70	0.65	0.68
Alpha-cellulose, %	91.07	...	...	91.74	92.28	90.93	90.65	89.80	87.84
Lignin, %	1.77	...	...	1.05	0.92	0.80	0.76	0.75	0.96
Viscosity, cp. 0.5% $CuEn_3(OH)_2$	19.09	18.96	12.10	12.90	10.64	9.06	8.71	7.89	6.49
Bleach requirement to obtain 85% brightness	16.00	...	...	8.00	8.00	7.00	8.00	8.00	7.50
Pentosans, %	18.02	...	...	17.37	17.43	17.67	17.89	17.37	17.51

The screened pulp yield and the screenings were not affected appreciably over the range of cooking times studied, and they were entirely satisfactory. The ash content showed a slight tendency to increase as the total cooking time exceeded 4 hours. This might be explaned by the fact that more pulp fines are produced as the cooking conditions become more drastic. The fines have a tendency to adsorb more strongly the dissolved matter from the cooking liquor and are more difficult to wash clean according to Richter *(30)*. The alpha-collulose content and the alcohol-benzene solubility did not change appreciably over the range of cooking times investigated.

The pentosan content, one of the most important properties of a viscose pulp, did not change over the range of cooking times studied, and it was found to be very high, ranging from 17 to 18%. Figure 1 shows that the pulp viscosity dropped rapidly as the total cooking time was increased from 2 to 3 hours, after which it still decreased, but at a much less rapid rate. Referring to Fig. 2, it can be seen that the lignin content decreased rapidly as the total cooking time was increased from 2 to 3 hours, after which it still decreased, but at a much less rapid rate. Referring to Fig. 2, it can be seen that the lignin content decreased rapidly as the total cooking time was increased from 2 to 3 hours. After 3 hours it remained practically constant. The bleach requirements decreased in the same manner as the lignin content, which was to be expected.

By comparing the characteristics of these pulps with those needed for a viscose pulp and described above, it can be seen that all characteristics were satisfactory except for the pentosan content, the ash content, and the lignin content. In making this comparison it was necessary to assume that when these pulps were bleached all properties other than pulp color would remain the same. Admittedly this is not necessarily true, for it is a known fact that bleaching reduces the lignin content and the ash content if carried out properly. However, for the purpose of determining the relative suitability of these pulps, this comparison was considered justified. The most satisfactory pulp was made by cooks Nos. 3-A and 3-B. Since the pulps had to be refined by some means to remove the pentosans, ash, and residual lignin, it was necessary to start with a pulp of sufficient viscosity to withstand such a treatment. Cooks Nos. 3-A and 3-B had a reasonably high pulp viscosity and low bleach requirements.

Effect of Varying the Maximum Cooking Temperature. In an attempt to increase the total cooking time and to eliminate more pentosans, a study of maximum cooking temperature was made. Very short cooking schedules such as were employed in preparing pulps Nos. 3-A and 3-B might prove difficult to reproduce in commercial practice. The effects of varying the maximum cooking temperature from 165 to 175°C. on the various pulp properties are shown in Table IV.

TABLE IV.—THE EFFECT OF MAXIMUM COOKING TEMPERATURE ON PULP PROPERTIES

Constant Cooking Conditions	
Total chemical as Na_2O used on the weight of moisture-free wood pulped, %	25
Sulphidity as Na_2O, %	33
Concentration of cooking liquor, g./l.	50
Liquor to wood weight ratio	5/1
Weight of moisture-free wood used per cook, g.	3,000
Maximum cooking time, hr.	5.5
Time to reach the maximum temperature, hr.	1.5
Time required at end of cook to drop pressure, hr.	0.5

Cook Number	10	9	6
Maximum cooking temperature, °C.	165	170	175
Screenings, %	0.07	0.03	0.33
Screened yield, %	47.65	47.20	47.09
Alcohol-benzene solubility, %	0.46	0.31	0.43
Ash, %	0.39	0.48	0.65
Alpha-cellulose, %	91.11	91.08	89.80
Lignin, %	0.96	1.07	0.75
Viscosity 0.5% $CuEn_2(OH)_2$, cp.	9.71	8.80	6.44
Bleach requirement to obtain 85% brightness	8.40	8.50	8.00
Pentosans, %	16.41	16.19	17.37

From the results obtained and presented in Table IV, it was concluded that the maximum cooking temperature over the range studied had no effect on screened pulp yields or per cent screenings. The yields and screenings were satisfactory over the entire range. The alpha-cellulose content was high enough and the alcohol-benzene solubility was low enough for the pulps to be suitable for conversion into viscose. Neither of these properties were appreciably affected by the changes made in the maximum cooking temperatures. The ash contents were still high in these pulps and they had a tendency to increase as the maximum cooking temperature was increased. The viscosity trend indicated that the cellulose was increasingly attacked as the maximum cooking temperature was raised, so the increasing ash content might again be explained by the formation of more pulp fines.

The data indicated that the pentosan content was not appreciably affected by changing the maximum cooking temperature. On the other hand the viscosity increased slightly as the cooking temperature was decreased. The lignin content was essentially constant. The bleach requirements were found to remain constant over the range of cooking temperatures studied. The net result of decreasing the maximum cooking temperature from 175 to 165°C. was to obtain a pulp of slightly higher viscosity. The fact was established by the work just described that regardless of the cooking conditions employed in this investigation, the pentosan content, the ash content, and the lignin content were too high to qualify the unrefined pulps as satisfactory viscose pulps. The next logical step in the investigation was to refine the most suitable pulp to remove these undesirable substances, and to obtain a satisfactory color. Pulp made by cook No. 3-B was chosen as the pulp to use in the refining experiments, because it had relatively high viscosity and yet a reasonably low bleach requirement.

Acid Hydrolysis—Alkaline Extraction Refining

After a preliminary bleaching investigation gave completely negative results, yielding pulps which contained as much pentosan as the unbleached pulps, a procedure similar to that suggested by Richter *(33)* was employed. This process consisted of treating the unprocessed pulp first with a hydrochloric acid solution and then with an alkaline solution. The acid treatment, being hydrolytic in nature, was employed to convert the alkali resistant pentosans to alkali soluble products. The role of the alkaline extraction was to remove all hydrolyzed pentosans and other alkali soluble pulp substances.

A detailed description of the general procedure used in this refining process follows: In each experiment a 6-gram (moisture-free) sample was weighed out carefully and placed in a 16-ounce rubber stoppered bottle. After it was decided how much acid was to be employed in the hydrolysis stage and what the moisture-free pulp consistency was to be, the calculated amount of water needed was carefully pipetted into the pulp sample. The sample was then thoroughly disintegrated by means of an electric stirrer. While still stirring, the calculated amount of hydrochloric acid was pipetted into the pulp suspen-

sion, and was thoroughly mixed with it. The bottle was stoppered and placed in a constant temperature bath which was regulated to some predetermined temperature. The mixture was shaken frequently. After the required time for the acid treatment had elapsed, the pulp suspension was filtered on a Buchner funnel and washed until all residual acid had been removed from the pulp. The moisture-free weight of the pulp was then determined and the acid treated pulp returned back to a clean stoppered bottle.

The amount of sodium hydroxide, based on the moisture-free weight of pulp, which was required to treat the pulp was then determined. The desired consistency was also chosen and the amount of a given caustic solution and the amount of water needed to make up the right conditions were calculated. The water was added to the pulp first and the mixture was disintegrated by means of an electric stirrer until a uniform suspension was obtained. The correct amount of caustic was added as the stirring continued. The bottle was stoppered and placed in a constant temperature bath regulated to some predetermined temperature. The mixture was stirred or shaken frequently. At the end of the extraction period, the pulp was filtered on a Buchner funnel and was washed until all the alkali had been removed. The sample was finally washed with alcohol and ether. The sample was shredded for analytical purposes as soon as it became air-dry. The sample was analyzed for pentosan content and pulp viscosity. A complete study of the acid treatment variables was made and included per cent chemical, temperature and time employed. Their effects on pulp pentosan content and pulp viscosity were noted. Likewise, a study of the alkaline extraction variables, per cent chemical, temperature and time employed was made, and their effects on the pulp pentosan content and pulp viscosity were noted.

After the optimum conditions of acid hydrolysis and alkaline extraction for removal of pentosans and preservation of the pulp viscosity were determined, two large batch refinings were made. Four hundred grams of moisture-free pulp were refined in each case, but the conditions employed varied slightly. These refined pulps were analyzed for yield, viscosity, pentosans and bleach requirements. It was found that the bleach requirements were so reduced by refining that a single-stage bleach could be used to obtain a pulp of satisfactory color. These pulps were then bleached.

TABLE V.—THE EFFECTS OF VARIOUS ALKALINE EXTRACTIONS ON THE PULP PENTOSAN CONTENT AND PULP VISCOSITY

The pulp employed was prepared by Cook No. 3-B

Experiment No.	NaOH Used, %	Temp., °C.	Time Used, hr.	Pulp Consistency, %	Viscosity $CuEn_2(OH)_2$, cp.	Pentosans, %
19	10	20	1	10	11.11	16.59
20	20	20	1	10	11.49	14.12
21	30	20	1	10	11.75	12.35
22	40	20	1	10	11.74	9.78
23	50	20	1	10	11.97	8.65
24	117	20	1	10	12.25	7.75
25	50	40	1	10	12.07	8.63
26	50	60	1	10	11.02	9.38
27	50	80	1	10	10.41	9.39
28	50	0	1	10	13.37	7.02
29	50	10	1	10	13.90	7.00
30	50	20	8	10	12.72	7.22
31	50	20	4	10	12.17	7.92
32	50	20	6	10	12.06	6.65
33	50	20	2	10	12.35	7.75

The final hypochlorite bleach consisted of treating the refined pulp at 3% consistency with the amount of calcium hypochlorite found to be necessary by the bleach requirement test. The temperature of the bleach was held between 35 and 37°C. The time employed was that found necessary for the pulp to reach a brightness of 85%. The pH of the system was continuously adjusted with dilute sodium hydroxide to maintain a value of 10.8 and prevent oxycellulose formation.

The final bleached pulps were completely analyzed and the results compared with those obtained on two commercial grades of viscose pulp.

Experimental Refining Results

The results of a preliminary study on the acid hydrolysis indicated that for investigating the alkaline extraction variables the acid hydrolysis could be carried out under the following fixed conditions:

Temperature of hydrolysis, °C.	50
Time of reaction, hour	2
Acid used (based on moisture-free pulp), %	10
Moisture-free pulp consistency, %	5

Under these conditions hydrolysis occurred indicating chemical attack on the pulp substance. Table V contains the complete data on the alkaline extraction investigations.

Three series of investigations were made on the alkaline extraction treatment; one on the amount of sodium hydroxide used, one on the temperatures at

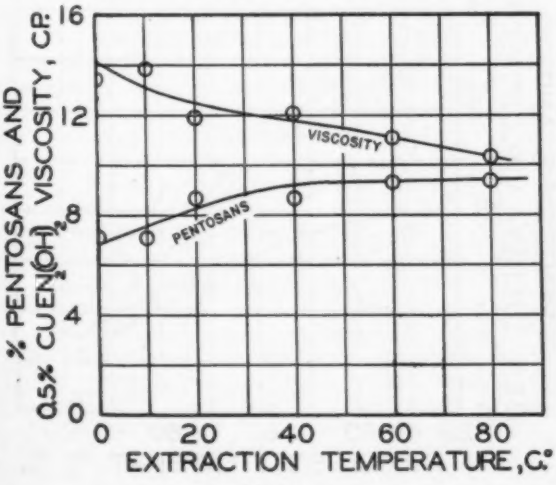

FIG. 4
The Effect of Alkaline Extraction Temperature on Pulp Pentosan Content and Viscosity

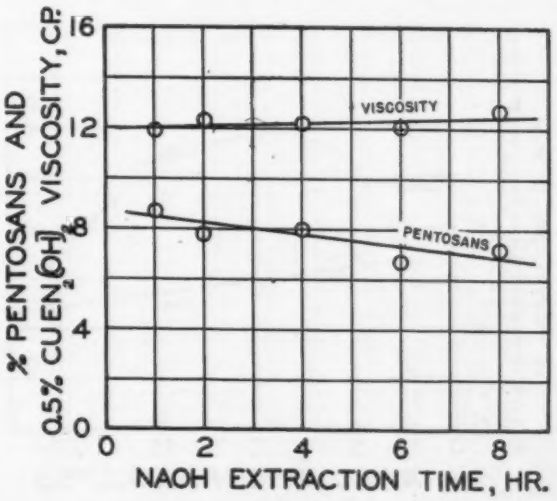

FIG. 5
The Effect of Alkaline Extraction Time on Pulp Pentosan Content and Viscosity

which the extractions were carried out, and one on the time required for the extractions. The effects of each variable on the pulp pentosan content and the pulp viscosity were noted. In making the study on the amount of sodium hydroxide employed, the temperature was held constant at 20°C., the time of the extraction at 1 hour, and the moisture-free pulp consistency at 10%. It was found that as the amount of sodium hydroxide employed in the extraction increased the pentosan content decreased. The pulp viscosity tended to increase as the amount of chemical employed was increased (Fig. 3). The decrease in the pentosan content was appreciable, but only slight improvement was noted as the amount of chemical employed was increased over 50%.

In the second series of experiments the temperature variable was studied. The fixed conditions employed were 50% sodium hydroxide, extraction time 1 hour, and moisture-free pulp consistency 10%. The extraction temperature was varied from 0 to 80°C. The data developed by this work and graphically presented in Fig. 4 indicate that more pentosans were removed at low temperatures. The pulp viscosity tended to increase at low temperatures also.

For making studies of the extraction time, the optimum amount of sodium hydroxide was used and one of the more favorable temperatures was selected. The fixed conditions of 50% chemical, based on the moisture-free pulp at 20°C., and a pulp consistency of 10% were employed. The results, shown in Fig. 5, indicate that, as the extraction time is increased, the pentosan content is reduced and the pulp viscosity is improved.

The net results of this study of the alkaline extraction conditions indicated that the optimum conditions were approximately as follows:

Chemical based on the moisture-free pulp weight, %	100
Moisture-free pulp consistency, %	10
Temperature, °C.	0
Time, hr.	8

These extraction conditions, employed subsequent to the particular acid treatment which was selected, removed the maximum amount of pentosans and yet improved the pulp viscosity over that of the original untreated pulp. The amount of alkali employed was found to be the most important variable.

Since the optimum alkali extraction conditions were found to differ widely from the conditions employed initially in the preliminary acid treatment investigation, it was necessary to make a second study of the acid treatment variables in which more favorable alkali extraction conditions were applied. Complete data covering this second acid treatment investigation may be found in Table VI.

TABLE VI.—THE EFFECTS OF VARIOUS ACID HYDROLYSIS TREATMENTS ON THE PULP PENTOSAN CONTENT AND THE PULP VISCOSITY

The pulp employed was prepared by Cook No. 3-B Alkaline Extraction Conditions

Sodium hydroxide employed based on the moisture-free weight of pulp, %	100.0
Moisture-free pulp consistency, %	10.0
Temperature, °C.	20
Time, hr.	8.0

Refining Experiment No.	HCl Used, %	Temp., °C.	Time Used, hr.	Pulp Consistency, %	Viscosity $CuEn_2(OH)_2$, cp.	Pentosans, %
34	5	70	2	5	10.49	6.44
37	10	70	2	5	11.70	5.56
35	15	70	2	5	9.24	5.27
36	20	70	2	5	7.64	4.78
38	20	70	4	5	6.90	4.48
39	20	70	6	5	6.43	4.39
40	20	70	8	5	5.43	4.39
44	20	30	2	5	13.01	7.13
45	20	50	2	5	11.99	7.49
46	20	90	2	5	4.00	3.54

Using the new alkaline extraction, the first acid treatment variable studied was the amount of chemical employed. For this series the hydrolysis temperature was held constant at 70°C., the hydrolysis time at 2 hours, and the pulp consistency at 5%. It was found that as the amount of acid employed was increased from 5 to 20%, more pentosans were removed and the pulp viscosity was decreased (Fig. 6).

Employing 20% acid at a pulp consistency of 5%, the hydrolysis time was held constant at 2 hours and the effect of hydrolysis temperature was investigated. It was noted that increasing the hydrolysis temperature from 30 to 90°C. reduced the pentosan content and also resulted in a rapid drop in the pulp viscosity (Fig. 7).

Still employing 20% acid at 5% pulp consistency, but taking 70°C. for the extraction temperature, a series of investigations was made to determine the effect of hydrolysis time. It was found, as may be noted in Fig. 8, that the pentosan content was not appreciably affected, but the pulp viscosity was decreased slightly.

The results of these investigations on the acid

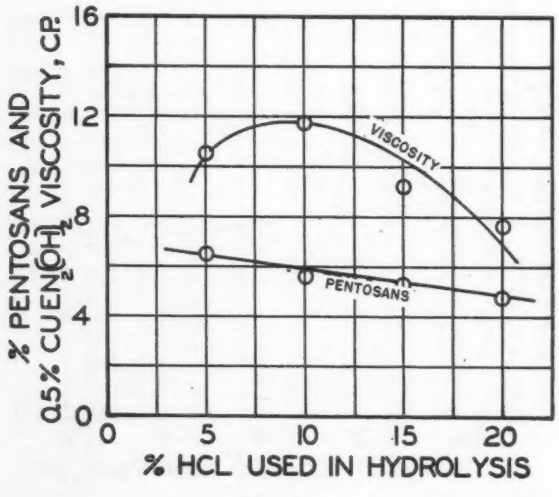

FIG. 6

The Effect of the Amount of Acid Used in the Hydrolysis on the Pulp Pentosan Content and Viscosity

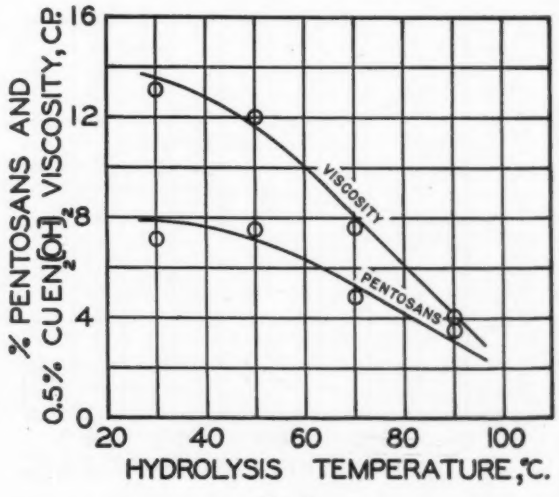

FIG. 7

The Effect of the Acid Hydrolysis Temperature on the Pulp Pentosan Content and Viscosity

treatment procedure indicated that either increasing the amount of acid used or increasing the temperature of the hydrolysis resulted in reducing the pentosan content and the pulp viscosity. The length of the acid treatment had little effect on the pentosan content or pulp viscosity. The optimum conditions for the acid hydrolysis were found to be as follows:

Acid employed based on the weight of moisture-free pulp, %	20
Moisture-free pulp consistency, %	5
Temperature, °C.	90
Time, hours	2

To prove the effectiveness of this acid hydrolysis-alkaline extraction procedure for refining hardwood sulphate pulps, two large portions of the untreated pulp No. 3-B were processed under the optimum conditions. These refining treatments were carried out as follows:

	Batch No. 1	Batch No. 2
Moisture-free pulp employed, grams	400	400
Acid Treatment:		
Hydrochloric acid employed based on the moisture-free weight of pulp, %	20	20
Moisture-free pulp consistency, %	5	5
Temperature, °C.	60	85
Time of hydrolysis, hours	2	2
Alkaline Extraction:		
Sodium hydroxide employed based on the moisture-free weight of pulp, %	100	100
Moisture-free pulp consistency, %	10	10
Temperature, °C.	20	0–5
Time of extraction, hours	8	8

The refined pulps were analyzed for yield, pentosans, viscosity, and the bleach requirements needed to bleach the pulps to an 85% brightness. The results of these analyses were compared with those obtained on the untreated pulp No. 3-B in Table VII.

TABLE VII.—COMPARISONS OF UNTREATED PULP AND REFINED PULPS PREPARED IN LARGE SCALE BATCHES

	Refined Pulp No. 3-B		Untreated Pulp
	Batch No. 1	Batch No. 2	No. 3-B
Yield, based on the weight of dry untreated pulp used, %	75.64	64.98	...
Pentosans, %	5.93	3.32	17.37
Viscosity 0.5% $CuEn_2(OH)_2$, cp.	10.14	4.66	12.50
Bleach requirement to attain 85% brightness (Higgins'), % chlorine on the moisture-free weight of pulp	2.20	1.45	8.00

The results of the pentosan determination and viscosity determination agreed well with the values that might be predicted on the basis of the small scale operations. The yields were found to be reasonable when the amount of pentosans removed was taken into consideration. The pentosan content of refined pulp No. 2 was suitable for a viscose pulp. The viscosity, while low, was still satisfactory for this purpose. To complete the preparation of these alkali refined pulps, they were subjected to a single-stage hypochlorite bleach treatment. The bleach was followed by a dilute acid wash that was applied to prevent color reversion. The conditions employed in both bleach and wash are listed below:

	Refined Pulp No. 3-B	
	Batch No. 1	Batch No. 2
Hypochlorite Bleach:		
Chlorine added on the weight of moisture-free pulp ($Ca(OCl)_2$ was used), %	3.0	2.0
Moisture-free pulp consistency, %	5.0	5.0
Bleaching temperature, °C.	35–37	35–37
Time required to attain 85% brightness, hours	9.0	9.0
pH (adjusted with NaOH)	10.8	10 8
Dilute Acid Wash:		
Sulphur dioxide added on weight of moisture-free pulp, %	1.0	1.0
Moisture-free pulp consistency, %	3.0	3.0
Washing temperature, °C.	20	20
Time of wash, hours	0.5	0 5

The bleached pulps were analyzed for the more significant pulp properties. The results were compared with those obtained from the analysis of two commercial viscose pulps and with the requirements for a viscose pulp obtained from the literature. All of these data are presented in Table VIII.

TABLE VIII.—COMPARISON OF THE CHEMICAL PROPERTIES OF THE BLEACHED REFINED PULPS NO. 1 AND NO. 2 WITH THOSE EXHIBITED BY VISCOSE PULPS

	Commercial Viscose Pulps		Requirements for a Viscose Pulp as Specified by the Literature	Sugar Maple Sulphate Pulp Refined and Bleached	
Analysis	Soft-wood Sulphite	Hard-wood Sulphite	(*35-41*)	No. 1	No. 2
Alcohol-benzene solubility, %	0.59	0.39	<0.50	0.43	0.46
Ash, %	0.12	0.27	<0.15	0.15	0.12
Viscosity 0.5% $CuEn_2(OH)_2$ cp.	11.23	6.54	2–12	3.96	3.49
Alpha-cellulose, %	91.56	89.02	> 88	96.01	93.35
Lignin, %	0.10	0.10	<0.10	0.10	0.10
Pentosans, %	2.95	3.09	<5.00	6.30	3.79
Brightness, %	92	87	> 85	87	87

Summary of Results

1. Sugar maple was pulped with ease by the sulphate process.

2. The pulps produced were universally high in pentosan content.

3. This pentosan content could not be reduced by increasing the length of the cooking period, at least through the range covered by this investigation.

4. The pentosan content could not be reduced by increasing the maximum cooking temperature, at least through the range investigated.

5. The pentosan content of the pulp could be materially reduced by an acid hydrolysis-alkaline extraction refining process.

6. In the acid hydrolysis stake of this process the temperature was the most important variable. The amount of acid employed was second in importance, followed by the length of the hydrolysis treatment.

7. It was found that the optimum acid treatment temperature was 90°C.

8. In the alkaline extraction stage of this process the quantity of chemical employed was found to be the most important variable. Amounts of sodium hydroxide under 5% of the weight of the pulp treated showed no refining effect whatever.

9. The optimum amount of sodium hydroxide to employ was found to be 100% based on the weight of the moisture-free pulp treated.

10. The refined pulp developed by this investigation, after bleaching by orthodox methods, gave a product that compared favorably with commercial grades of viscose pulp.

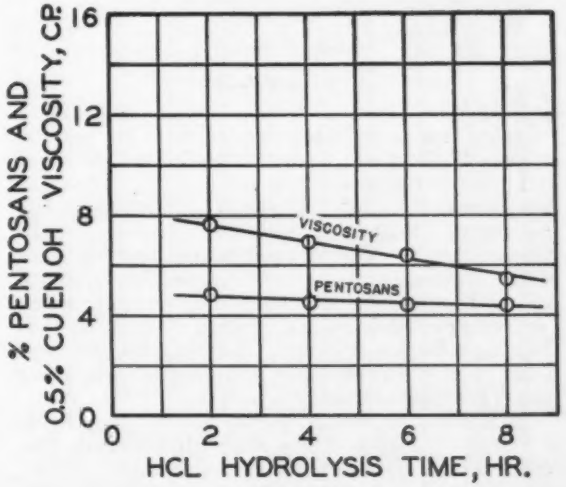

FIG. 8

The Effect of Acid Hydrolysis Time on the Pulp Pentosan Content and Viscosity

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The Silicones

John Wiley & Sons have recently published an "Introduction to the Chemistry of the Silicones" by Eugene G. Rochow, research chemist for the General Electric Company (137 pp. 6 x 9¼). The silicones have attracted considerable attention during the past year because of their newly developed applications such as bonding fiber board, bonding mica and insulating varnishes, vehicles for heat-resistant paints. They are being used also as damping fluids for precision instruments, gauges and other controls, as a lubricant, protective coating, and for providing a high degree of water repellency to other than silica base materials.

To use the organosilicon materials intelligently it is first necessary to understand their behavior. The first few chapters review the silanes and their derivatives in detail, in order to furnish an understanding of the fundamental chemistry of the nonsilicate compounds of silicon. The later chapters discuss those silicon polymers which have achieved commercial importance.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $2.75 per copy.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Williamson G. Brasfield, Jr., Chemical Engineer, Union Bag & Paper Corp., Savannah, Georgia, a 1933 graduate of the Alabama Polytechnic Institute. He was formerly employed by the State Highway Department, Montgomery, Alabama, and the Southern Kraft Corp., Panama City, Florida. He served five years in the United States Army.

Robert Q. Conner, Industrial Engineer, Crossett Paper Mills, Crossett, Arkansas, a 1936 graduate of the University of Cincinnati. He was formerly employed by the Buckeye Cotton Oil Co., Little Rock, Arkansas, and the Arkansas Power & Light Co., Pine Bluff, Arkansas. He served five years in the United States Army.

Joseph J. Koenig, Research Director, Gaylord Container Corp., St. Louis, Missouri, a 1932 graduate of the University of Missouri. He has been with the company since 1937.

Thomas J. Smith, Manager, Chicago Industrial Division, The Powers Regulator Co., Chicago, Illinois, a 1926 graduate of Armour Institute. He has been with the company since 1927.

Herbert H. Wymore, Technical Assistant to the Paper Mill Superintendent, Crown Willammette Paper Co. Division, Crown Zellerbach Corp., Camas, Washington, a 1938 graduate of Oregon State College. He has been with the company since 1938.

Pete M. E. Wright, Sales Engineer, The Bagley & Sewall Co., Watertown, New York. He was formerly employed by the St. Regis Paper Co., Deferiet, New York, and the Black-Clawson Co., Hamilton, Ohio.

Philip C. Evanoff, Technical Director, Dill & Collins Division of The Mead Corp., Philadelphia, Pennsylvania. He attended Temple University and the University of Pennsylvania. He has been with his present company since 1933.

John N. Evert, Assistant Chemist, International Paper Co., York Haven, Pennsylvania, a 1940 graduate of the University of Wisconsin. He has been with his present company since graduation with the exception of four years during which he served in the U. S. Army.

Orin Andrew Weiss

Orin Andrew Weiss, consulting engineer, died of a heart attack at his home in New York City on August 12, last. He was born 43 years ago in Minneapolis, Minn. He was a member of the American Society of Mechanical Engineers, The Society of Automotive Engineers, The American Welding Society, The Army Ordnance Association, The Society of American Military Engineers of Washington, and The Technical Association of the Pulp and Paper Industry. Mr. Weiss served in World War II and was honorably discharged from the army in March, 1943. He is survived by his wife and by a brother, Edward Everett Weiss.

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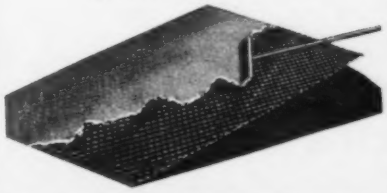

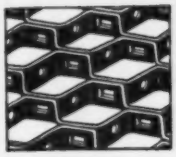

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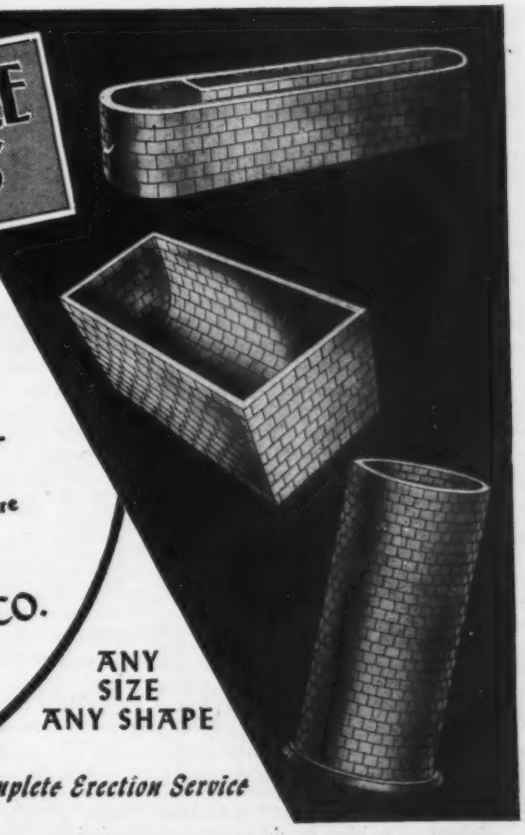

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Week's Record of Trends in The Pulp and Paper Market

Office of the PAPER TRADE JOURNAL,
Wednesday, December 4, 1946.

Two major obstables threaten to upset the smooth record flow of paper, pulp and related products; they are a looming coal shortage and a boxcar famine. Ordinarily paper mills have ample stocks of coal on hand at this time of the year. However, some mills report shortages of coal serious enough to threaten plant shutdowns within the next two or three weeks. One plant, the Dexter Sulphite, Pulp and Paper Company, as long as two weeks ago reported only eight days' supply of coal on hand, and no more than a three days' supply on the rails. Paper mills not only need coal for production of their product, but for heating their plant facilities; for the production of chemicals and other raw materials without which they cannot produce paper. Perhaps hardest hit by the boxcar shortage are the New England paper mills. These big northern mills, as a rule, have no storage facilities; they load their paper directly from paper machines onto freight cars. Recently, the Great Northern Paper Company reportedly was threatened with a shutdown because of the lack of cars. Closing was averted by railroads providing some "cripple" cars for storage. Meanwhile, certain mills report they may soon have to cut operations from five days to four days a week due to the lack of freight cars. Smaller mills needing about ten cars a day, but receiving around five or six, are finding it means the difference between profit and loss; and are threatened with complete shutdowns. In the South the car shortage is retarding receipts of pulpwood to some mills, thus interfering with production to a limited extent. In Chicago, the manufacture of paper cups is seriously handicapped by the current car shortage which slows down paper and pulp shipments in that area.

To date, market trends for paper and pulp have shown little or no change since decontrol. Instead of increasing production of low priced papers, as previously indicated by trade reports, manufacturers generally seem to be discontinuing output of most low priced items, and concentrating on grade "A" production. Most manufacturers seem to feel that this condition will remain as long as raw materials prices, for such items as waste paper and pulp, continue unsettled. Uneasiness of wood pulp supplies is creating a wider use for flax and raw cotton. Rag content mills are having difficulties obtaining quality rags because of the increase in manufacture of rayons and acetates together with special treatments of all types of fabrics which make these materials unfit for high grade papers.

The index of general business activity for the week ended November 23 fell to 142.6 from 143.1 in the previous week, compared with 124.1 for the corresponding week in 1945. The index of paperboard production rose to 172.7 from 167.4 in the previous week, compared with 165.5 for the corresponding week in 1945.

Paper production for the week ended November 23 was estimated at 106.6 percent, compared with 104.9 for the preceding week, with 91.4 for the corresponding week in 1945, with 87.2 for 1944, with 87.6 for 1943, and with 82.3 percent for the corresponding week in 1942.

Paperboard production for the week ended November 23 was 100.0 percent of capacity, compared with 101.0 for the preceding week, with 91.0 for the corresponding week in 1945, with 91.0 for 1944, with 91.0 for 1943, and with 77.0 percent for the corresponding week in 1942.

Wood Pulp

A survey by the Paper Trade Journal of imported wood pulp prices reveals the following quotations as being the most widely received in the United States to date.

Canadian manufacturers' prices, f.o.b. shipping point, less freight allowances unless otherwise specified.

	Per Short Ton
Regular Kraft	$95.00 to $97.50
Select Unbleached Kraft (no freight allowance)	99.00" —
Unbleached Sulphite	100.00" —
Glassine Unbleached Sulphate (no freight allowance)	90.00" —
Bleached Soda	93.50" 107.50
Groundwood	70.00" 75.00
Sideruns Pulping News	74.00" —
Hardwood and Specialty Grades	Nominal

Swedish wood pulp prices, per ton of 2,000 lbs. air dry weight on dock usual Atlantic and Gulf ports with an average freight cost of about $9.00 per short ton included. Subject to change as it is said these prices are not satisfactory to Swedish producers.

	Per Short Ton
Bleached Sulphite	$120.00
Bleached Kraft	126.00
Unbleached Sulphite	95.00
Unbleached Kraft	89.00
Finnish quotations f.o.b. shipping point	Per ton
Bleached Sulphite	$165.00
Unbleached Sulphite	132.50
Unbleached Sulphite (special grade)	137.50
Unbleached Sulphate	132.50
Unbleached Sulphate (special grade)	159.00

Other European countries, at the present time, are not quoting on prompt and forward deliveries of wood pulp, because they have no tonnage available for export.

Rags

Demand continues very active for new cotton cuttings with fine paper mills paying top prices for most all offerings. Domestic white cuttings are taken at $10.50 per 100 pounds, unbleached muslins at $11.00; white back blue overalls $8.25. New foreign white cuttings are taken up at $13.00 to $15.00 per 100 pounds; and foreign light prints at $8.00 to $10.00. Old domestic No. 1 white cottons repacked are $5.00. Old foreign No. 1 white linens when they are available are taken up at $14.00 to $16.00.

Old Rope and Bagging

Market for old rope continues unchanged. Manila remaining 5.75c to 6.00c for domestic, and 6.00c to 7.00c for foreign when it is available. Sisal stays at the 4.50c to 5.00c level.

Bagging market showed definite signs of firmness this week with domestic No. 1 gunny in active demand at $4.25 to $4.50 per 100 pounds to paper mills f.o.b. New York. Foreign gunny is still $4.75 to $5.00. Domestic heavy wool tares are currently $4.75 to $5.00 per 100 pounds.

Waste Paper

Paper mills are expressing some concern over their inability to enlarge on waste paper inventories. With consumption continuing at peak levels, over-all inventories at Eastern mills remain static at an average of 13 days. Twenty-day supplies are considered by most mills as necessary to cover reduced collections resulting from severe weather.

Price levels for waste paper are keeping pace with heavy demands. Kraft envelope cuttings are currently $80.00 to $85.00 per ton baled to paper mills f.o.b. New York. Mixed Kraft and envelope cuttings are running around $70. No. 1 hard white envelope cuts, one cut, are $100.00 to $110.00.

Trivedi Learns Paper At Consolidated Mill

WISCONSIN RAPIDS, Wis.—A native of India, Saraswatchandra Ambalal Trivedi, is working temporarily in the technical department of the Consolidated Water Power and Paper Company. He recently received his master's degree in chemical engineering at the University of Wisconsin and will spend about seven weeks working at Consolidated and from there will go to several other paper mills in the United States before returning to India.

Before coming to the United States, he received two bachelor of science degrees from Bombay University, one in chemistry, the other in chemical engineering.

He decided to specialize in the pulp and paper industry after he came to America, and he hopes to get a position in that field upon his return to his native country. There are paper mills in India where they use bamboo instead of wood in manufacturing, he said.

Mr. Trivedi gave a talk Monday evening, November 25, before the Wisconsin Rapids Lions Club at the Paper Inn at Port Edwards. He discussed customs and traditions of India.

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LOBDELL Roll Calipers are accurate to one thousandth of an inch; are light in weight to permit easy handling by one man; and are readily adjusted to widely varying roll diameters.

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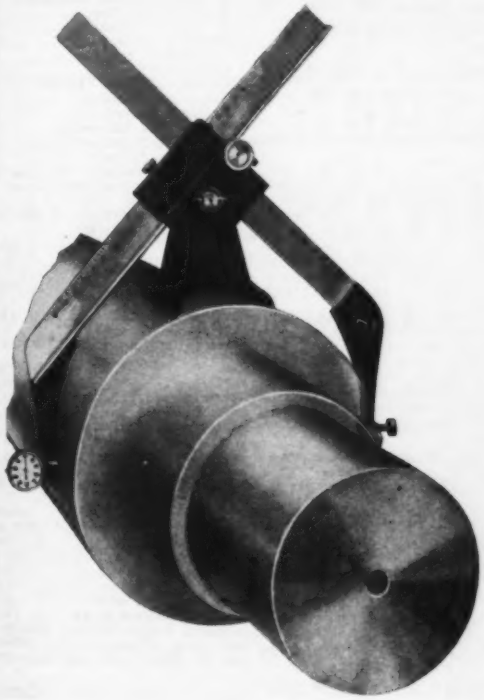

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, December 4, 1946.

BLANC FIXE — Demand continues active as raw materials remain tight. Pulp currently quoted at $40 per ton, in barrels, car lots, at works; the powder is currently quoted at $60 per ton, car lots, f.o.b. works.

BLEACHING POWDER — Shipments temporarily delayed due to drum shortage, supplies reported adequate to meet demand. Quotations are unchanged. Prices on bleaching powder range from $2.50 to $3.10 per 100 pounds, in drums, car lots at works.

CASEIN—Current prices on processed acid-precipitated casein are reported around 47 to 51 cents per pound for both domestic and Argentine grades; f.o.b. shipping point, with quantity not specified at the present time.

CAUSTIC SODA—Supplies tightest ever as market remains critical. Shipments are behind schedule. Cutback production further reduces stocks. Solid caustic soda is quoted at $2.30 per 100 pounds; flaked and ground is quoted at $2.70 to $2.95 per 100 pounds. All prices car lots.

CHINA CLAY—Supplies are becoming tighter as demand continues to increase. Quotations remain unchanged. Domestic filler clay is currently quoted at from $8.50 to $9 per ton; coating clay is quoted at from $12 to $22 per ton, at mine. Imported clay is quoted at from $22 to $25 per long ton, ship side. All prices quoted in car lots.

CHLORINE — Demand continues to exceed output, market tight, stocks low. Tank cars and steel container situation slow shipments. Quotations unchanged. Chlorine is currently quoted at $2.00 to $2.25 per 100 pounds, in single unit tank cars, f.o.b. works.

ROSIN—Gum rosin in drums, per 100 pounds net, in yard, New York, B & D, $8.30; E, $8.50; F, G, H, I, M, N, WG & WW, $8.70. Prices in car lots for drums and bags. Wood rosin, B, $6.35; FF, $7.35; G to K, $8.50; WW, $8.55, X, $8.65. Prices l.c.l. per 100 pounds f.o.b. N Y. export warehouse.

SALT CAKE — Demand increasing with supplies showing some improvement. Prices remain unchanged. Domestic salt cake is quoted at $15 per ton in bulk. Chrome salt cake is quoted at $16 per ton. All prices in car lots f.o.b. shipping point.

SODA ASH—Supplies continue short, demand active, previous orders filled. Export inquiry very heavy. Quotations continue unchanged. Current prices, car lots, per 100 pounds, are as follows: in bulk, $.95; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Supplies are showing steady improvement. Previous orders filled. Starch prices continue unchanged. The pearl grade is quoted at $4.77 per 100 pounds; powdered starch at $4.87 per 100 pounds; both prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA—Demand active, supply fair. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.20 per 100 pounds, in bags, car lots, f.o.b. works. The iron free is currently quoted at $1.75 to $2.00 per 100 pounds, in bags, at works.

SULPHUR—Strong seasonal demand is reported with stocks plentiful to meet all requirements. Annual contracts are quoted at $16 per long ton, f.o.b. mines; the price f.o.b. at Gulf Ports is $17.50 per long ton. All prices in car lots.

TALC—Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $24 to $30 per ton. All prices on car lots.

MARKET QUOTATIONS

With the sudden, but not unforeseen, elimination of all OPA price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume of business still is being done, under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market. As the emergency conditions pass, it may be expected that the quotations will become more generally applicable.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract	$84.00	@	—
Sheets	103.00	"	—
Kraft—per cwt.—Carload Quantities Zone A, Delivered			
Superstandard			
Wrapping	*$5.75	@	$6.00
No. 1 Wrapping	*5.50	"	5.75
Standard Wrapping	*5.25	"	5.50
Standard bag	*5.25	"	5.50

* Prices for Standard Wrapping are for 40 lb. base weight; for Standard Bag for 30 lb. base weight.

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.			
Wh. No. 1 Frd.	1.10	@	1.20
Wh. No. 1 M. G.	1.10	@	1.20
Wh. No. 1½	.95	@	1.10
Wh. No. 2	1.00	@	1.10
Wh. Anti-Tar.	2.25	@	3.50
Kraft Unbl.	1.15	@	1.25
Manila No. 2	.90	@	1.05
Toilet—Per Case of 100 rolls 1 M Sheets.			
Unbleached	4.47	@	5.50
Bleached	6.50	"	—
Paper Towels — Per Case of 3750 Zone 1.			
Wh. C. fold 11x13½	4.09	@	—
Br. Sgl. fold 10 in.	2.37	"	2.48
Br. M'tif'd 9½x14¾	3.48	"	—
Br. M'tif'd 9½x9¾	2.37	"	2.48
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila 35 lb.	6.00	"	7.00
Boards, per ton—			
News	*70.00	@	75.00
Chip	*67.50	"	73.00
Sgl. Mla. Ll Chip	*80.00	"	89.00
White Pat. Coated	*86.00	"	101.50
Kraft Liners 50 lb.	*74.00	"	84.00
Binders Boards	94.00	"	126.00

Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $4.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—White, Assorted Items

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.75 @	$46.75	$40.90 @	$48.00
100% Rag.	32.85 "	38.50	34.00 "	40.00
85% Rag	.... "	....	30.55 "	38.75
75% Rag	24.30 "	28.50	24.45 "	30.00
65% Rag	.... "	....	.... "	....
50% Rag	20.05 "	24.50	21.25 "	25.75
25% Rag	17.85 "	21.75	19.00 "	23.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers.. White, Assorted Items

	Bonds		Ledgers	
No. 1	$12.00 @	$14.50	$13.15 @	$16.00
No. 2	11.25 "	13.75	12.25 "	15.00
No. 3	.... "	....	.... "	....
No. 4	10.60 "	13.00	11.75 "	14.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper

No. 1 Glossy Coated	$14.70 @		$16.75
No. 2 Glossy Coated	13.75 "		15.50
No. 3 Glossy Coated	13.20 "		16.00
No. 4 Glossy Coated	12.80 "		14.50
No. 1 Antique (Watermarked)	11.35 "		12.75
No. 2 Offset	10.65 "		12.25
A Grade E. F.	10.60 "		12.00
A Grade S. & S. C.	11.00 "		12.50
B Grade E. F.	10.30 "		11.75
B Grade S. C.	10.70 "		12.25
C Grade E. F.	10.00 "		11.50
C Grade S. C.	10.40 "		12.00
D Grade E. F.	9.70 "		11.00
D Grade S. & S. C.	10.10 "		11.50

Ivory & India at $.50 cwt. extra.

Wood Pulp

Domestic Manufacturers' Prices, Less Freight Allowances.

Bl. Softwood Sulphite	$103.50
Unbl. Softwood Sulphite	90.00
Bl. Hardwood Sulphite	100.50
Unbl. Hardwood Sulphite	87.50
N. Bleached Sulphate	103.50
S. Bleached Sulphate	97.00
N. Semi-Bleached Sulphate	98.00
S. Semi-Bleached Sulphate	91.50
N. Unbl. Sulphate	83.50
S. Unbl. Sulphate	76.50
Bleached Soda	93.50
Unbleached Soda	88.00
Groundwood	64.00
Ground—Machine Dried	67.00
Sulphite Screenings	50.00
Sulphate Screenings	44.00
Groundwood Screenings	37.50
N. Unbl. Sulphate Siderums	83.50
S. Unbl. Sulphate Siderums	76.50
Standard Newsprint Siderums	64.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$12.50
Lake Central	12.50
Southern	15.00
West Coast (in area)	9.50
West Coast (out area)	15.50

	50%-80% Air Dry Weight
Northeast	$10.50
Lake Central	10.50
Southern	13.00
West Coast (in area)	8.50
West Coast (out area)	14.50

Applying to Producers of Dry Wood Pulp.

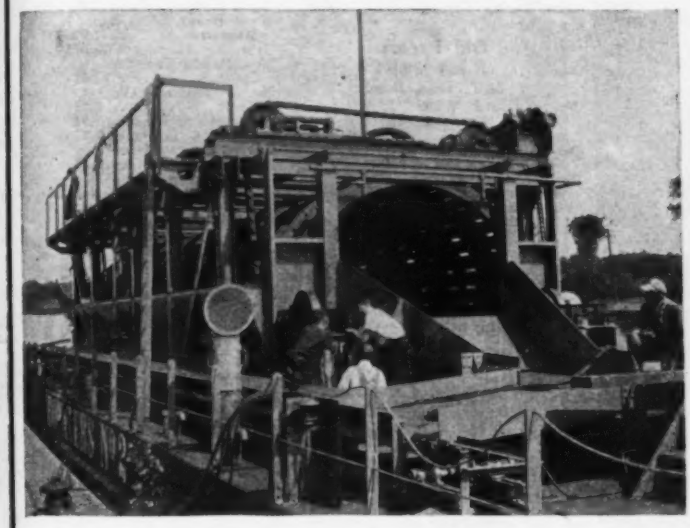
	Above 80% Air Dry Weight
Northeast	$7.50
Lake Central	7.50
Southern	10.00
West Coast (in area)	6.50
West Coast (out area)	12.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum price.

New Domestic Cotton Cuttings

(Prices delivered Mill Plus Dealer's Commission)

	Per 100 lbs.
White Shirt	$10.50
Light Silesias	7.50
Unbleached Muslin	11.00
White Back Blue Overalls	8.25
Blue Overalls	7.75
Unbl. Fancy Shirt	4.50
Light Percales	5.50
Light Prints	5.25
Washables	4.00
Blaechable Khaki	5.50
Unbleachable Khaki	5.00
Cottonades	4.50



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Stanley Steel Strapping makes shipping quicker and more economical: gives your customer faster delivery and an easier package to unpackage. The Stanley Steel Strapping System includes tools, reels and accessories.

THE STANLEY WORKS STEEL STRAPPING DIVISION NEW BRITAIN, CONNECTICUT

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked	$5.00
No. 1 Whites Miscellaneous	4.25
No. 2 Whites Repacked	4.00
No. 2 Whites Miscellaneous	3.50
Blue Overalls	3.75
Thirds and Blues Repacked	3.00
Thirds and Blues Miscellaneous	2.50
No. 1 Roofing Rags	1.85
No. 2 Roofing Rags	1.75
No. 3 Jute Bagging	1.65
No. 4 Brussels and hard back carpets	1.65
No. 5A Roofing Rags	1.65

New Foreign Cotton Cuttings

(Prices delivered Mill)

	Per 100 lbs.
New Dark Cuttings	$6.00 to ....
New Mixed Cuttings	6.50 " ....
Light Silesias	9.00 " 10.00
Light Flannelettes	8.00 " 9.00
New White Cuttings	13.00 " 15.00
Fancy Shirt Cuttings	9.00 " 10.00
Light Prints	8.00 " 10.00
Bleachable Khaki, No. 1	7.00 " 7.50
Unbl. Khaki, No. 1	6.25 " 6.75

Old Foreign Rags

(F.O.B. New York)

	Per 100 lbs.
No. 1 White Linens	$14.00 to 16.00
No. 2 White Linens	12.00 " 13.00
No. 3 White Linens	8.00 " 9.00
No. 4 White Linens	8.00 " 9.00
No. 1 White Cottons	10.00 " 12.00
No. 2 White Cottons	8.00 " 9.00
No. 3 White Cottons	6.50 " 7.00
No. 4 White Cottons	5.00 " 5.50
Extra Light Prints	7.50 " 8.00
No. 1 New Light Prints	6.25 " 6.75
Med. Light Prints	5.25 " 5.75
Dutch Blue Cottons	5.25 " 5.50
Checks and Blues	4.00 " 4.25
Linsey Garments	4.50 " 5.00
Dark Cottons	3.75 " 4.00
Old Shopperies	3.25 " 3.50
New Shopperies	3.25 " 3.50

BAGGING

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1	$4.75 to 5.00
Domestic Gunny, No. 1	4.25 " 4.50
Light Wool Tares	4.50 " 4.75
Heavy Wool Tares	4.75 " 5.00
Bright Bagging	4.25 " 4.50
Foreign Manila Rope	6.00 " 7.00
Domestic Manila Rope	5.75 " ....
Jute Strings	4.50 " 5.00
No. 1 Sisal Strings	4.00 " 4.50
Mixed Strings	1.75 " ....

Waste Paper

Prices to Mills

(Dollars Per Ton)

F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00 @ $110.00
No. 1 Hard White Envelope Cuts	85.00 " 100.00
No. 1 Hard White Shavings, unruled	100.00 " —
No. 1 Hard White Shavings, ruled	80.00 " 90.00
Soft White Shavings, one cut	85.00 " 90.00
No. 1 Soft White Shavings	75.00 " 80.00
Soft White Shavings, Misc.	65.00 " —
No. 1 Fly Leaf Shavings	40.00 " —
No. 2 Fly Leaf Shavings	(nominal)
No. 1 Groundwood Fly Leaf Shavings	30.00 " 33.00
No. 2 Mixed Groundwood Fly Leaf Shavings	(nominal)
Mixed Colored Shavings	(nominal)
Mixed Groundwood Colored Shavings	(nominal)
Overissue Magazines	(nominal)
No. 1 Heavy Books & Magazines	38.50 " —
Mixed Books	22.00 " 25.00
No. 1 White Ledger	50.00 " 52.00
No. 2 Mixed Ledger, colored	40.00 " 45.00
New Manila Envelope Cuttings, one cut	65.00 " 75.00
New Manila Envelope Cuttings	65.00 " 75.00
Extra Manilas	(nominal)
Mixed Kraft, Env. & Bag Cuttings	70.00 " —
Kraft Envelope Cuttings	80.00 " 85.00
Triple Sorted, No. 1 Brown Soft Kraft	55.00 " —
New 100% Kraft Corrugated Cuttings	55.00 " 60.00
No. 1 Assorted Old Kraft	40.00 " —
New Jute Corrugated Cuttings	27.00 " —
Old 100% Kraft Corrugated Containers	(nominal)
Box Board Cuttings	23.00 " —
White Blank News	45.00 " —
Overissue News	35.00 " —
No. 1 News	25.00 " 26.00
No. 1 Mixed Paper	19.00 " 21.00
Old Corrugated	28.00 " 30.00
Mill Wrappers	22.00 " 25.00

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—	
India	.26 @ —
White Hemp	.26 " —
Fine Polished—	
Fine India	.31 " —
Unpolished—	
Box	.20¼ " —
Paper Makers	.20 " —
Tube Rope	.22 " —
Wall Paper	.23½ " —
Wrapping	.26 " —
Soft Fiber Rope	.22 " —
Cotton	.28 " —
(Hard Fiber)	
Medium Java	.23 " —
Mex. Sisal	.21 " —
Manila	.33 " —

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¾
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old

White No. 1—Repacked	3.30 @ —
Miscellaneous No. 1	3.20 " —
Miscellaneous No. 2	2.80 " —
White No. 2—Repacked	2.90 " —
Thirds and Blues—	
Miscellaneous	1.80 " —
Repacked	2.20 " —
Black Stockings—(Export)	Nominal
Roofing Stock—	
Foreign No. 1	Nominal
Domestic No. 1	1.55 " —
Domestic No. 2	1.45 " —
Roofing Bagging	1.35 " —
Old Manila Rope	5.75 " —

Bagging

(F. o. b. Phila.)

Gunny No. 1—	
Foreign	Nominal
Domestic	3.00 @ 3.50
No. 1 Clean Bright—Sisal Strings	.04 " —
No. 2 Clean Bright—Sisal Strings	.03 " —
Sisal Jute	.02¾ " .02¾
Scrap—	
No. 1	3.25 " 3.50
No. 2	1.75 " 1.80
Wool Tares, heavy	1.00 " 1.10
No. 1 New Light Burlap	3.00 " 4.00
New Burlap Cuttings	3.75 " 4.00

Old Papers

(F. o. b. Phila.)

Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½ @ —
No. 1 Hard White Shavings, unruled	2.87½ " —
Soft White Shavings, one cut	2.50 " —
White Blank News	1.65 " —
Soft White Shavings,	

BOSTON

Old Papers

(F. o. b. Boston)

Mill Prices, Baled

No. 1 Hard White Shavings, unruled	4.00 @ —
No. 1 Hard White Shavings, ruled	4.00 " —
Soft White Shavings, Mis.	2.15 " —
No. 1 Fly Leaf Shavings	2.00 " —
No. 2 Fly Leaf Shavings	1.65 " —
No. 1 Groundwood Fly Leaf Shavings	1.25 " —
No. 2 Groundwood Fly Leaf Shavings	.90 " —
Mixed Colored Shavings	.75 " —
New Manila Envelope Cuts, one cut	2.87½ " —
Hard White Envelope Cuts, one cut	3.37½ " —
Triple Sorted No. 1 Brown Soft Kraft	3.00 " —
Mixed Kraft Env. & Bag Cuttings	2.75 " —
Kraft Envelope Cuttings	3.25 " —
No. 1 Heavy Books & Magazines	1.91½ " —
New Manila Envelope Cuts, one cut	2.87½ " —
New Manila Envelope Cuttings	2.65 " —
White and Colored Tabulating Cards	2.25 " —
Groundwood Tabulating Cards	1.35 " —
White Blank News	1.65 " —
No. 1 Assorted Old Kraft	1.75 " —
No. 1 Mixed Paper	.95 " —
Overissue News	1.25 " —
Box Board Cuttings	.72½ " —
New Corrugated Cuttings, Kraft	2.25 " —
Old 100% Kraft Corrugated Containers	1.75 " —
Old Corrugated Containers	1.40 " —
Jute Corrugated Cuttings	1.07½ " —

Bagging

(F. o. b. Boston)

Gunny Bagging—	
Foreign	4.50 @ —
Domestic	4.25 " —
Sisal Rope No. 1	5.00 " —
Sisal Rope No. 2	4.50 " —
Mixed Rope	2.00 " —
Transmission Rope—	
Foreign	(nominal)
Domestic	3.50 " —
Manila Rope—	
Foreign	(nominal)
Domestic	5.75 " —
Soft Jute Rope	5.00 " 5.25
Jute Carpet Threads	3.00 " 3.50
Bleachery Burlap	8.50 " 9.00
Scrap Burlap—	
Foreign	(nominal)
Domestic	4.50 " 4.75

Waste Paper

(F. o. b. Chicago)

Mill Prices, Baled

Shavings—	
No. 1 Hard White Envelope Cuts, one cut	3.37½ @ —
No. 1 Hard White Shavings unruled	2.87½ " —
No. 1 Soft White Shavings	1.31 " —
Misc.	2.13 " —
No. 1 White Ledger	2.30 " —
No. 2 Ledger, colored	2.00 " —
No. 1 Heavy Books & Magazines	1.92½ " —
Overissue Magazines	1.67½ " —
New Manila Envelope Cuttings	2.65 " —
No. 1 Assorted Old Kraft	1.75 " —
No. 1 Mixed Paper	.95 " —
Box Board Cuttings	.72½ " —
Kraft Corrugated Cuttings	2.25 " —
Old Corrugated Containers	1.40 " —
Overissue News	1.00 " —
No. 1 News	1.00 " —

South America	4.50 " 5.00
Wool Tares—	
Foreign	4.85 " 5.25
Domestic	4.85 " 5.25
Aust. Wool Pouches	5.00 " 5.35
New Zealand Wool Pouches	— " 3.50
New Burlap Cuttings	5.50 " 6.00
Heavy Baling Bagging	4.50 " 5.00
Paper Mill Bagging	2.50 " 3.00
No. 1 Roofing Bagging	1.60 " 1.75

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—	
New Light Prints	.06 @ .06½
Fancy Percales	.04¼ " .05
New White No. 1	.06¾ " .07
New Light Flannelettes	.09½ " .10
Canton Flannels, Bleached	.06 " .06¾
Underwear Cutters, Bleached	.06¼ " .06¾
Underwear Cutters, Unbleached	.05¾ " .06
Silesias No. 1	.06 " .06¾
New Black Silesias	.03 " .03¾
Red Cotton Cuttings	.03½ " .04
Soft Unbleached	.11½ " .12
Blue Cheviots	.05½ " .06
Fancy	.02¾ " —
Washable	.02¾ " —
Khaki Cuttings	.02¾ " .03
O. D. Khaki	.06 " .06¼
Corduroy	.03¼ " .03½
New Canvas	.06¼ " .06½
B. V. D. Cuttings	.11½ " .12

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—	
Repacked	3.80 @ —
Miscellaneous	3.20 " —
White No. 2—	
Miscellaneous	2.65 " —
Twos and Blues, Repacked	2.20 " —
Old Blue Overalls	2.25 " 2.50
Thirds and Blues, Repacked	2.20 " —
Miscellaneous	1.80 " —
Black Stockings	3.50 " 4.00
Roofing Stock—	
No. 1	2.00 " —
No. 2	1.90 " 2.00
No. 3	1.35 " —
No. 4	1.35 " —
No. 5, Quality A.	1.35 " —
Quality B.	1.20 " —
Quality C.	.95 " —
Old Manila Rope	5.75 " —

Foreign Rags

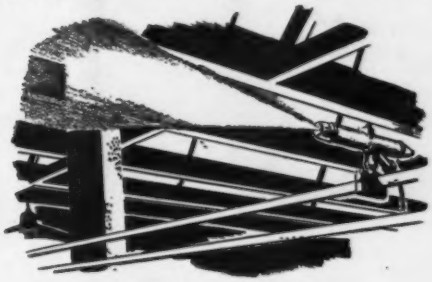
(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

No. 1 White Ledger	2.30 " —
No. 1 Heavy Books & Magazines	1.92½ " —
White Blank News	1.65 " —
Mixed Kraft Env. & Bag Cuttings	2.75 " —
No. 1 Assorted Old Kraft	1.75 " —
Overissue News	1.10 " —
No. 1 News	1.00 " —
No. 1 Mixed Paper	.95 " —
No. 1 Roofing Rags	1.50 " —
No. 1 Roofing Bags	1.40 " —

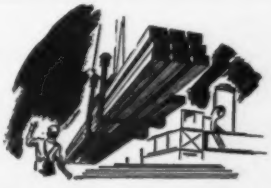
Mist FOR GOOD AND EVIL



Mist, sprayed in process plants requiring high humidity, is vital to the quality of many products. But, it raises havoc with the wood structures. And steam and chemical-laden vapors in wet process plants cause ordinary lumber to go to pieces in a hurry.

Wolmanized Lumber*, wood that's impregnated with Wolman Salts* preservative, is highly resistant to the decay that inevitably develops in these humid atmospheres. Fibre-fixation prevents its washing out or leaching, assures added years of service life.

The Advantages of Building with Wood



Building with wood means ease and speed of erection, light weight, resilience, high insulating value, paintability, low first cost and . . . when Wolmanized . . . long life.

1680 McCORMICK BUILDING, CHICAGO 4, ILLINOIS

LOOKING FOR HIGHER COAGULATING EFFICIENCY?

Your search stops here! Jar tests using activated silica sol prove that the N-Sol Process coagulating aids produce clear, sparkling water.

Notice the spectacular formation of the floc—its large heavy tough characteristics, its prompt settling. What you accomplish in the jar test, you can translate to full plant operation. Real dollar and cent economies result in increased capacity, longer filter runs, better color removal.

Now is the time to request samples of N Brand Silicate of Soda with directions for use to demonstrate the value of an N-Sol Process in your plant. Send your requests to Dept. B, 121 So. 3rd Street, Phila. 6.

These processes fit any coagulating procedure in paper mills:

N-Sol-A* — N Brand reacted with ammonium sulfate. Used where chloramine sterilization is desired.

N-Sol-B — N Brand reacted with alum. Used with any sterilization procedure. (U. S. Pat. 2,310,009)

Baylis Sol — N Brand Silicate reacted with sulphuric acid. Used with any sterilization procedure. (U. S. Pat. 2,217,466).

N-Sol-D — N Brand reacted with sodium bicarbonate. Used with any sterilization procedure.

* Patent Applied For.

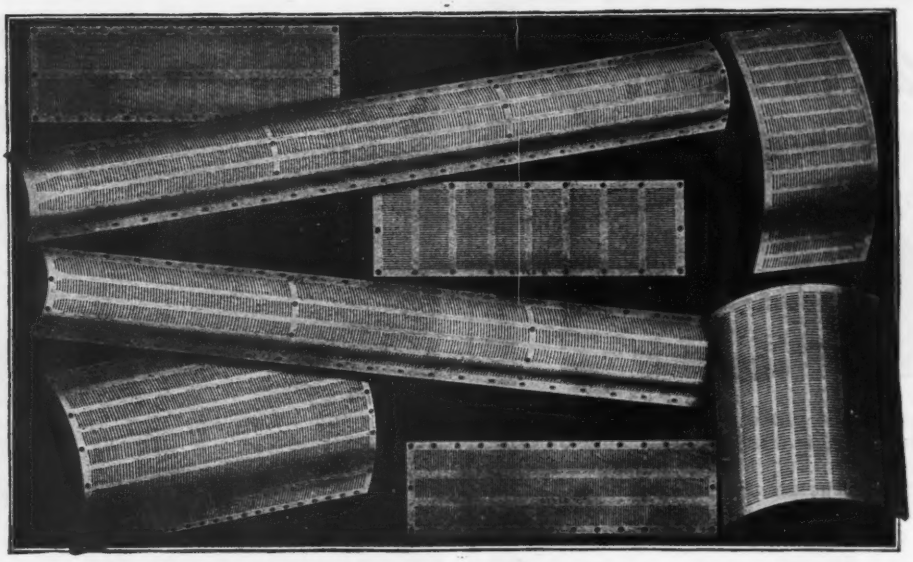
1831 • 115th Anniversary • 1946

N-SOL PROCESSES FOR WATER COAGULATION

Developed and Patented by

Philadelphia Quartz Company

Available under license without charge • Philadelphia 6



"HARDY" BRONZE and CHROME-NICKEL-STEEL SCREEN PLATES.

MAGNUS METAL CORP. FITCHBURG, MASS.

A LONG TIME TO LOAD THE TRUCK

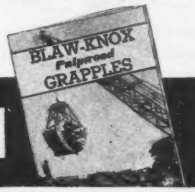
3½ MIN. TO UNLOAD IT!

It takes this Blaw-Knox Size No. 8 Grapple just 1 minute, 16 seconds to pick up and stack a full cord of 16 ft. length wood. Think of the man-hours, truck time and crane time saved by such speed and efficiency! Wherever pulpwood is handled you'll find Blaw-Knox Grapples on the job.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY

2119 Farmers Bank Bldg., Pittsburgh 22, Pa.

New York • Chicago • Philadelphia • Birmingham • Washington

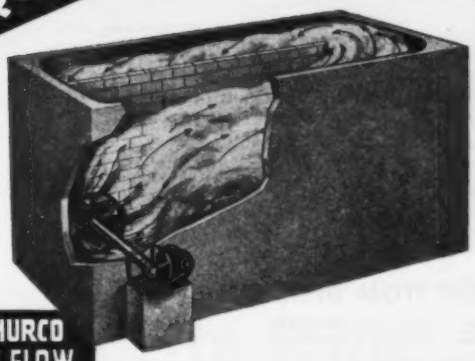


For complete data write for Bulletin No. 2043.

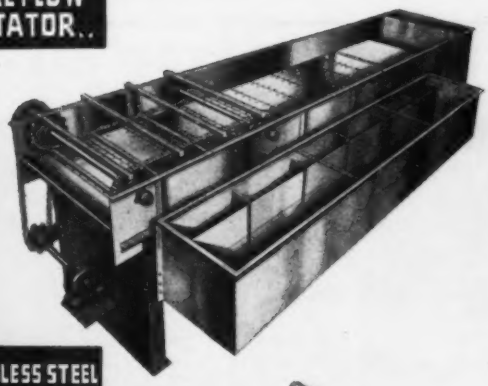
BLAW-KNOX PULPWOOD GRAPPLES

ASK FOR DETAILS ON NEW MURCO EQUIPMENT

TRADE MARK MURCO REG. U.S. PAT. OFF.

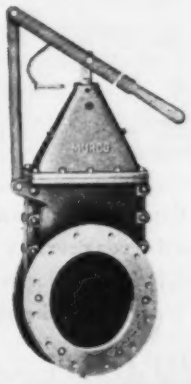


NEW MURCO AXIAL FLOW AGITATOR..



STAINLESS STEEL IMPROVED FLAT SCREEN

MURCO QUICK OPENING GATE VALVE



Above are three of the latest Murray MURCO equipment for which complete details will be sent upon request. Murray woodroom and paper-mill equipment has for over half a century been serving the paper industry.

D. J. MURRAY MANUFACTURING CO.
WAUSAU, WISCONSIN

It doesn't *Cost* to switch to JOHNSON *Rotary Pressure* JOINTS ... it *Pays!*

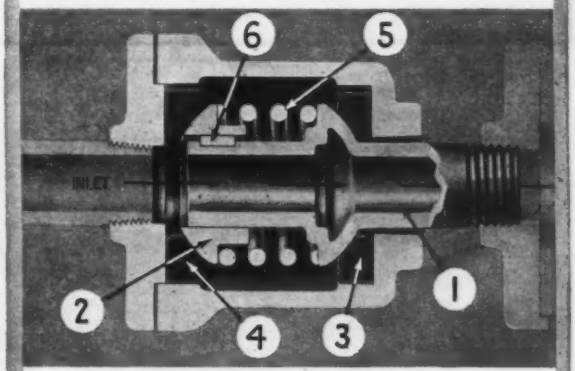
Johnson Rotary Pressure Joints provide the modern, engineered way to get steam in, and condensate out, of cans.

They save valuable production time otherwise lost when machines are shut down for repacking stuffing boxes or repairing ravages of misalignment.

Production is also boosted because Johnson Joints provide a simple, better way to install more efficient methods of syphon drainage.

Maintenance costs come down. Johnson Joints are packless, self-oiling, self-adjusting and self-aligning. Precious manhours, ordinarily required for the old-style stuffing boxes, can be released for more productive work.

Increased plant efficiency alone would make the Johnson Joints a good investment, yet the savings in maintenance can quickly pay the cost of changing over.



Completely Packless. Rotating member consists of nipple (1) and sliding collar (2), keyed together (6). Seal is accomplished by carbon graphite ring (3), forced by pressure tightly against nipple.

Self-Oiling. Seal ring and bearing ring (4) are of long-lived carbon graphite—require no lubrication.

Self-Adjusting. Spring (5) is for initial seating only. Joint in operation is pressure sealed; the higher the pressure, the tighter the seal.

Self-Aligning. Ball and socket joints between rotating member and rings provide angular flexibility. Space between nipple and housing allows lateral movement.

WRITE FOR COMPLETE INFORMATION

The Johnson Corporation

828 WOOD STREET, THREE RIVERS, MICHIGAN

MERRITT-CHAPMAN & SCOTT CORPORATION

LARGE PAPER AND PULP MILL PROJECTS ACCOMPLISHED IN RECORD TIME AND AT LOW COST

PROJECTS COMPLETED

Southland Paper Mills, Inc.	Lufkin, Texas
Union Bag & Paper Corporation	Savannah, Georgia
National Container Corporation	Jacksonville, Florida
Container Corporation of America	Fernandina, Florida
Champion Paper & Fibre Company	Pasadena, Texas
Bedford Pulp & Paper Company, Inc.	Big Island, Va.

PROJECTS UNDER CONSTRUCTION

Alabama Pulp & Paper Company	Cantonment, Florida
Hudson Pulp & Paper Company	Palatka, Florida
Dexter Sulphite Pulp & Paper Co.	Dexter, N. Y.
B. F. D. Company	Ogdensburg and Plattsburg, N. Y.

ENGINEERING CONSTRUCTION DIVISION

17 BATTERY PLACE, NEW YORK

Brown Company's current expansion program includes the construction of this new pulp mill at Berlin, N. H. in order to provide for increased paper and pulp demand.

BROWN COMPANY

FOREMOST PRODUCERS PURIFIED CELLULOSE

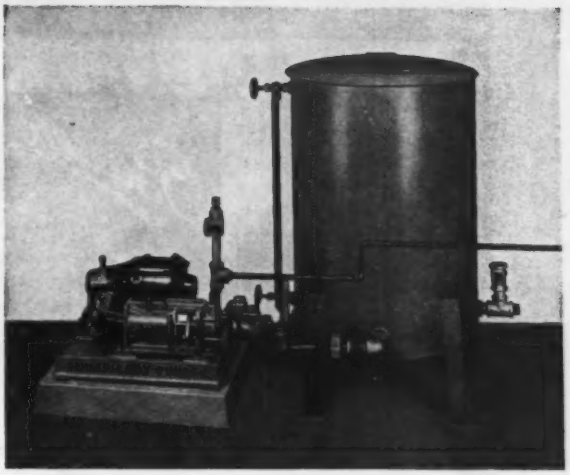
New Life With Butterworth Refills

Here's how you can give new life to calender stacks . . . assure maximum production and many extra hours of service. Let our skilled craftsmen refill your present calender rolls by the special Butterworth process. In many mills, a single Butterworth Refill placed in the stack with other rolls has led these mills to standardize on Butterworth Calender Rolls. Remember, the finish on the paper can only be as good as the rolls in the calender.

Every Butterworth Roll is made to specification and tested to meet Butterworth's standards for hardness, smoothness and density before delivery. Let us serve you.

For full information, write or call H. W. Butterworth & Sons Company, Philadelphia 25, Pa. — Textile Finishing Machinery Company Division, Providence, R. I. : : Charlotte, N. C., 1211 Johnston Bldg. : : In Canada — W. J. Westaway Co., Hamilton, Ont.

Butterworth CALENDER ROLLS



MILTON ROY

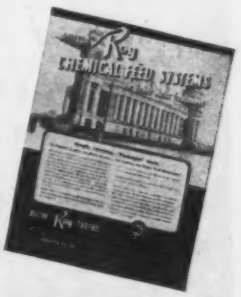
CHEMICAL FEED SYSTEMS

for Boiler Water Treatments

Authorities agree two distinct methods are necessary for chemically treating boiler water. Sodium Sulfite should be fed into the suction side of the feed water pump . . . to remove dissolved oxygen, insure against corrosion and prevent pitting. Other treating chemicals, such as phosphates, soda ash and caustics cannot usually be fed in this manner. Individual chemical feed directly into each boiler is the approved method . . . to prevent scale formation, control alkalinity and prevent embrittlement.

Milton Roy "Packaged Units" are available for both treating methods. For internal treating the unit includes heavy gage welded steel tank, gage glass, low level pump cut-out and alarm, together with necessary pump or pumps. For sulfite feed the unit includes 50 gal. 12 gage welded tank, gage glass, low level pump cut-out, bell alarm, doughnut float and one Milton Roy Pump with screw adjustment of stroke.

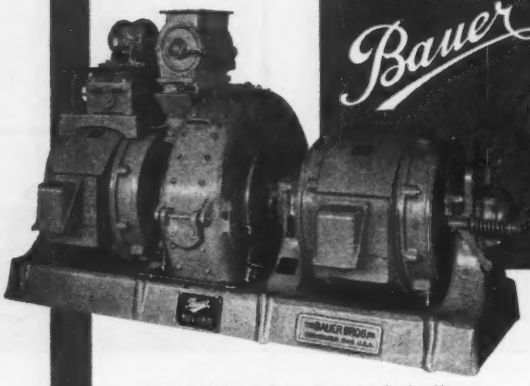
These "Packaged Units" are available also with electronic control, to continuously operate at a speed proportional to the rate of feed water flow as measured by a standard type flow meter. Fully automatic control is thus obtained, treatments are precisely as required, waste of chemicals is avoided.



For complete description of these systems, with specifications, diagrams, selection tables, etc., write for Bulletin 451. If interested in automatic controls, ask also for Bulletin 468.

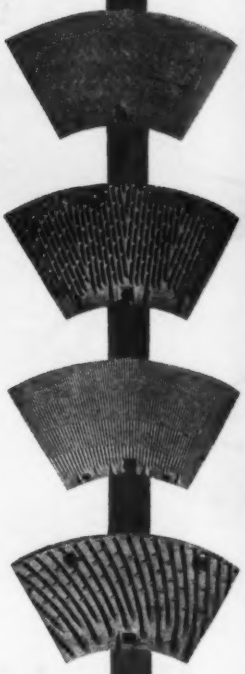
MILTON Roy COMPANY

1376 E. MERMAID AVE., CHESTNUT HILL, PHILA. 18, PA.



Bauer

PULPER SALES SHOW GAIN OF 154%



These days such an increase in itself may mean little — until we add that repeat orders from satisfied users account for much of that increase.

Five Bauers to mills making toilet tissue; *Ten* Bauers to mills running rotogravure, book and other fine papers — also newsprint. *Several* Bauers for another mill group running a wide variety of grades. Still other Bauers for other large mills or mill chains.

Therein you have a true measure of acceptance of the Bauer Pulper for fast, efficient and economical pulping of a wide range of stocks, reject salvaging, etc. Two sizes. Full range of plate patterns. Further information, with technical data, furnished on request.

THE BAUER BROS. CO.
SPRINGFIELD, OHIO

Waterproof Weatherproof Prevents Corrosion

NEW INSULATING MASTIC

NOW AVAILABLE

★

FOR FURTHER INFORMATION WRITE, WIRE OR PHONE

THIS new INSULATING MASTIC is the ideal material for use on equipment such as caustic liquor tanks, soap tanks, hot water tanks and evaporators. Easily applied to any dry and reasonably clean metal surface, it adheres securely — does not need to be held in place nor does it need a protective covering. Permanently water and weatherproof and very inert to the overflow of caustic liquors. The underlying metal is permanently protected from corrosion.

No other type of insulation can be secured at such low first cost or cost so little for maintenance.

We also have Industrial Paint Finishes for all service requirements around sulphate pulp mills and rayon plants.

★ EARL PAINT CORP., UTICA, NEW YORK ★

CC-3 floor type, with special attachment for center mounting of heavy bottom slitters . . . an exclusive Rogers feature.

ROGERS CC-3 for All Around Circular and Rotary KNIFE GRINDING

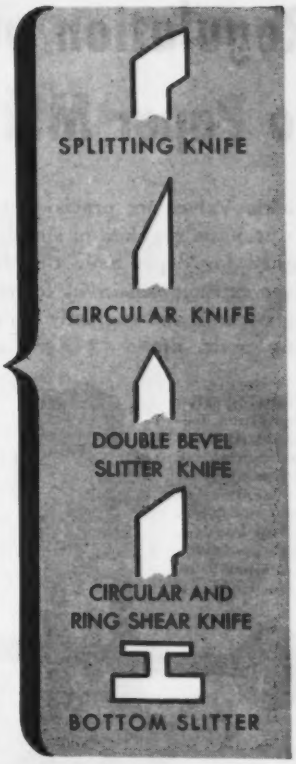
•

Sharpen These Knives Fast . . . Accurately

Rogers CC-3 is precision engineered with rugged construction for long continuous operation. Anyone can operate it and easily grind true cutting edges on knives from 2" to 20" in diameter. Prompt delivery.

Write for circular CC.

SAMUEL C. ROGERS & COMPANY
202 DUTTON AVENUE BUFFALO 11, N. Y.



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IMMEDIATE DELIVERY FROM OUR NEW YORK STOCK

"OFF THE SHELF SERVICE"

SEND FOR OUR CATALOG

WHAT YOU WANT — WHEN YOU WANT IT

PATRON TRANSMISSION CO.

129 GRAND STREET NEW YORK 13, N. Y.

Regulation and Control to Paper Mill Standards

Stickle Valves are precision made for accurate regulation; simply designed for dependable operation; given extreme sensitivity for exacting control; and ruggedly built for long service life.

A single-seated valve piston, balanced with pilot stem, insures a leak proof valve in Series 400 design (at right) available in Spring Loaded, Weight Loaded and Lever Types. Bulletin No. 435.

Stickle Valves are especially made to supply the accurate regulation and close control essential for high efficiency in paper production. Available in Double-Seated, Semi-Balanced and Single-Seated, Balanced series in wide range of sizes.

Stickle Regulating Valves, Series 200 (at right) semi-balanced, in Spring Loaded, Weight Loaded, and Lever Types. Bulletin No. 235 — At left, a Spring Balanced Valve of exceptional merit for small equipment.

STICKLE

STEAM SPECIALTIES COMPANY

2215 VALLEY AVENUE • INDIANAPOLIS 1, INDIANA

Other Stickle Equipment for Paper Mills

Stickle Automatic Paper Drying Systems—either with standard Stickle Tension Control or Stickle Tension and Thermal Control—reduce manual attention, improve operating efficiency, increase volume, save steam, control moisture content to predetermined content, and improve quality of product. Bulletin No. 160.

Stickle Differential Drainage—a rapid circulation system permitting operation of paper machines at varying pressures and pumping condensate direct to boilers at high temperature with Boiler Return System or to feed water heater with high duty vacuum pump.

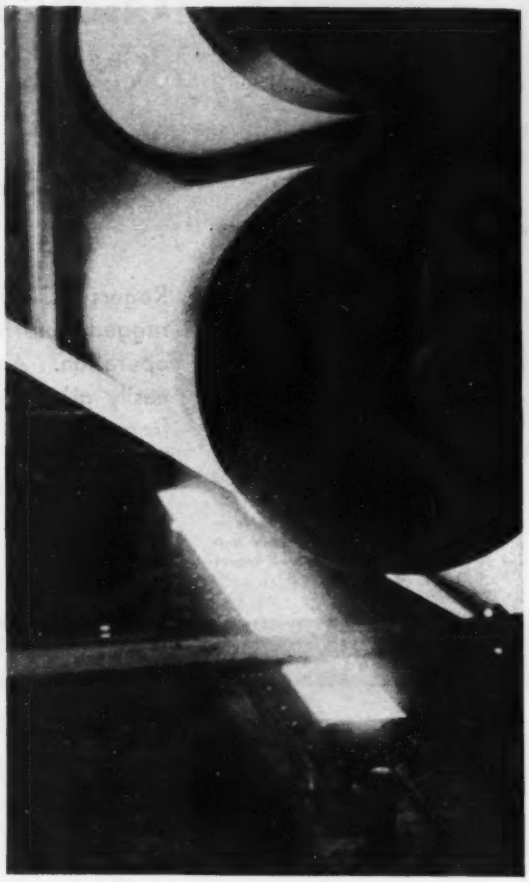
Stickle Open Float Steam Traps—in series designs for all purposes and sizes for capacity requirements. Widely used for individual dryer drainage and other drainage needs in paper mills. Bulletins Nos. 415, 315, and 115.

Stickle Open Coil Feed Water Heaters—guaranteed for larger capacity in smaller space. Large range of sizes in deaerating and non-deaerating types. Long service life with negligible upkeep cost. Bulletin No. 117.

Stickle Oil and Steam Separators—large steam areas and four baffles for repeated reduction of velocities remove all cylinder oil from exhaust steam. Horizontal and vertical types. Bulletin No. 200.

RED-RAY

INFRA-RED BURNERS



INCREASED DRYING SPEED

WITH

RED-RAY BURNERS

NO ADDITIONAL SPACE REQUIRED.

Write for Complete Information

RED-RAY MANUFACTURING CO.

455 W. 45th Street **New York 19, N. Y.**

ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

Holyoke Wires

for

Better Service

Manfg. by

Holyoke Wire Cloth Co.
Holyoke, Mass.

★

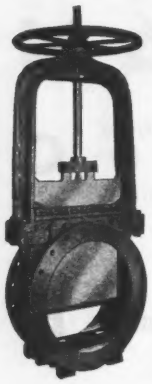
BARNEY BENSON — BOB WILLIAMS
HOWARD GERBER — PAUL FOSTER
PETER TALBOT, Jr.

WILLIAMS-GRAY CO.
221 North LaSalle Street
Chicago — Illinois

★

Lindsay & Niagara Wires
Knox "Excelsior" Felts
Siamese & Richland Dryer Felts
Tensilastic Rubber Rolls
Splicing Tissues
Deckle Webbing
Etc.

★



RECORD PAPER & PULP STOCK VALVES "BONNETLESS SELF CLEARING" – – – "RESIDUE POCKETLESS TYPE"

METALS — I.B.B.M., all iron, bronze or stainless steels, body parts plain or rubber lined.

The photo of 24" Fig. 241 I. B. B. M. valve while illustrating the gate bottom wedge system for forced gate seating and "GUILLOTINE" edge for shearing fibre at seat also shows the packing box and yoke as separate units. Both adjustable.

- The "FAST THREADED" screw stem and ball bearing speeds valve operation.
- The packing box is extra deep, is adjustable and provided with specialized lubricated packings and special type gland and compression bolts.
- The yoke mountings are such that yokes for various methods of gate operation are interchangeable.
- Replaceable gate edge shoes are used in valves 10" and larger. These shoes are of special value when valves are installed stem and pipe horizontal.

"RECORD PRODUCTS EXTENSIVELY USED IN DEFENSE PROJECTS."

RECORD FOUNDRY & MACHINE COMPANY

LIVERMORE FALLS, MAINE, U. S. A.

PRICE & PIERCE, Ltd.

WOOD PULP & PAPER AGENTS

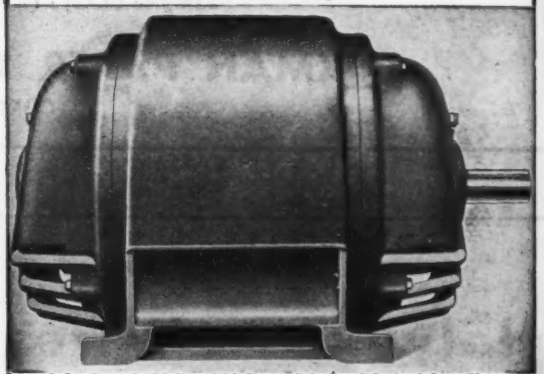
for domestic and export

60 EAST 42nd STREET
New York 17, N.Y.

Continental

SQUIRREL CAGE MOTORS

1 to 600 Hp.



A Continental 150 Hp. 1800 R.p.m. Drip-Proof Squirrel Cage Motor

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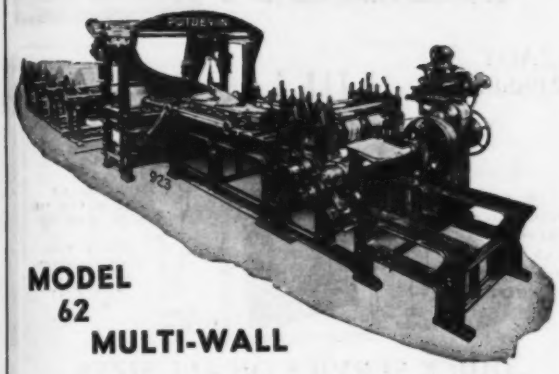

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CEMENT BAG TUBER

Tubes produced on this POTDEVIN Tuber are complete with the valve cut out and ready for the valving and sewing operations.

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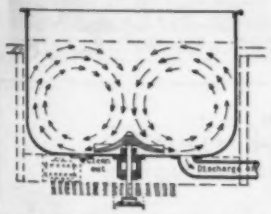

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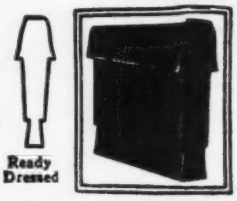
THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL

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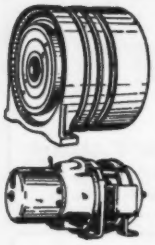
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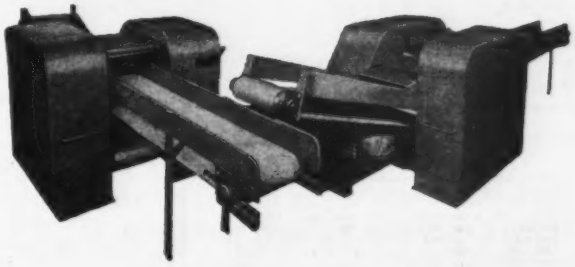

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illustrated cross cuts rags, at a rate of 1½ tons an hour, greatly speeding up better production.

Ask about the Taylor-Stiles machine exactly suited to the paper making job you have to do.

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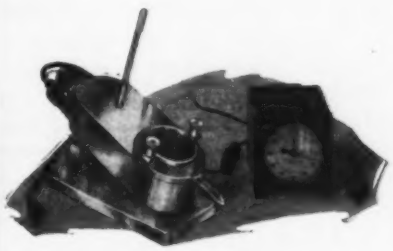

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- Pulp Testing Ovens
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CHARLES P. RAYMOND SERVICE, Inc.
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Specializing in Paper Mill Personnel
Positions Now Open.

Board mill superintendent
Master mechanics, mechanical engineers, plant engineers, assistant master mechanics, draftsmen and designers
Finishing foreman groundwood papers
Chemist, chemical engineers and technical control and research chemists $3600-$10,000 year
Manager, superintendent, foremen, machine and back tender for fast running news print mill (foreign)
Tour boss cylinder machine roofing felt mill
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We invite correspondence (Strictly Confidential) with paper and pulp mill executives seeking new positions and with employers seeking new personnel. D-5

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Leading and long established international paper exporting organization maintaining own companies and agencies throughout the world seeks the services of capable purchase executive possessing personal paper mill contacts and business relations. Position offers unusual opportunities for man interested in permanency and security and well paying future. In applying applicants must give complete resume and full particulars regarding background, business experience, age and salary desired. Address Box 46-839 care Paper Trade Journal. D-12

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IMMEDIATE OPENING FOR A TOUR FOREMAN WORKING ROTATING SHIFTS.
ONE M. F. PICKUP AND ONE YANKEE PICKUP FOURDRINIER TISSUE MACHINES ARE OPERATING AT PRESENT. A THIRD HIGH SPEED TISSUE MACHINE WILL BE IN OPERATION IN LATE 1947.
WE PREFER A MAN 30-40 YEARS OF AGE WITH SOME TECHNICAL BACKGROUND. EXPERIENCE ON HIGH SPEED TISSUE MACHINES MAKING BOTH FLAT AND CREPED PAPERS DESIRABLE.
SEND COMPLETE RESUME GIVING EDUCATION AND EXPERIENCE TO
FERNSTROM PAPER MILLS, INC.
Pomona, California D-26

GUMMING SUPERVISOR—Wanted by large well established paper converter. Should have practical experience in production of gummed paper and cloth tapes and gummed specialty papers. Give full details of qualifications and experience. Address Box 46-612 care Paper Trade Journal. D-19

WANTED—Chemical Engineer for development and research laboratory. Prefer man with experience in fields of coating, printing and laminating for quality converting plant located in Midwest. Responsible position with excellent future. Address Box 46-821 care Paper Trade Journal. D-5

WANTED — CHEMICAL ENGINEER — A growing paper converting plant in middle west requires a man of experience and vision. Should have mechanical experience necessary to increase present methods of printing, waxing, coating and laminating paper and foil. Replies will be held confidential. Address Box 46-837 care Paper Trade Journal. D-5

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Specialty Bag Foreman

We are an established manufacturer opening a new department in which we will begin to manufacture Specialty Bags, using all new equipment, beginning in January. We seek an aggressive, intelligent and experienced Specialty Bag man capable of handling all manufacturing problems in this new division of our business. This man must have a thorough knowledge of bag machines and printing. He must be able to handle personnel well. To such a man we offer an attractive beginning salary plus an opportunity limited only to ability to produce. State age, education, complete experience and how soon available. All replies held in strict confidence. Write or Wire box 46-832 c/o Paper Trade Journal. D-21

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Exceptional opportunity for a thoroughly experienced lightweight tissue production supervisor. Position open in New York State mill. Must have ability to train personnel for quality production. Many opportunities for advancement. Furnish full details. Box #46-848 care Paper Trade Journal. D-5

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PLANT MANAGER—thorough experience in converting paper and boards; wants change to position offering better opportunity. Excellent production and labor relations background. Address Box 46-694 care Paper Trade Journal. D-26

SUCCESSFUL BOXBOARD SALESMAN — Many years experience, both mill and selling on road, now available. Address Box 46-826 care Paper Trade Journal. D-19

SUPERINTENDENT: Desires position with small concern interested in improving quality, increasing production, lower operating cost. Salary no object. Age 39 years. Excellent reference. Address Box 46-846 care Paper Trade Journal. D-26

WANTED—Position as Superintendent by man 40 years of age. All grades of folding including .016 test liner. Will consider Asst. Supt. or Night Supt. Address Box 46-841 care Paper Trade Journal. D-12

Director of Pulp Research and Development

available next spring. More than twenty years activity in the industry; specialty dissolving pulps and sulfate pulp bleaching. Will also consider Canada. Salary $10,000 minimum depending on living condition. Address Box 46-811 care Paper Trade Journal. D-7

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FOR IMMEDIATE DISPOSAL

400 HP Harris Corliss Steam Engine in good condition.

Complete Mechanical Power Transmission Equipment, including Philadelphia Geared Reducer, 125 HP, Ratio 1⅔ to 1, in good condition and over 100 pulleys of various sizes.

2 Complete Paper Machine Drives in operative condition.

2 Moore & White Paper Machine Drives in good condition.

This equipment can be inspected at any time.

MAKE US AN OFFER

GOLDEN FLEECE CO., INC.
Bancroft, Mass. TF

PAPER MILL EQUIPMENT FOR SALE

110" Hamblet & 80" Finley Sheeters.
68" Rice, Barton, Fales Slitter-Rewinder.
34" Iaman shear cut Slitter.
Kidder Rotary Press, 4 colors one side, two on reverse, 34" cut.
54" Brown & Carver hand clamp Power Cutter.
14 x 22 John Thomson.
38" Burton heavy duty Rotary Perforator.
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Baling Presses—NEW—Both hand & power.

THOMAS W. HALL COMPANY, Inc.
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DILTS BREAKER BEATER

Bandless Roll 62" diameter x 54" face—70 tons daily capacity.
Equipped with Shartle Bros. Ragger.

J. J. ROSS COMPANY
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FOR SALE

FOR SALE

5—Noble & Wood Monarch motor driven Jordans, plain bearings, with 5 Westinghouse 100 HP, 3 phase, 60 cycle, 440 volt gear type motors, 437 RPM output with starters.

4—Westinghouse Induction 125 H.P. 3 phase, 60 cycle, 440 volt, 385 RPM motors with starters

1—150 H.P. Westinghouse slip ring, 3 phase, 60 cycle, 440 volt motor, 435 RPM. Double end shaft. Drum control and resistors and starter.

SHARTLE BROS
Middletown, Ohio D-5

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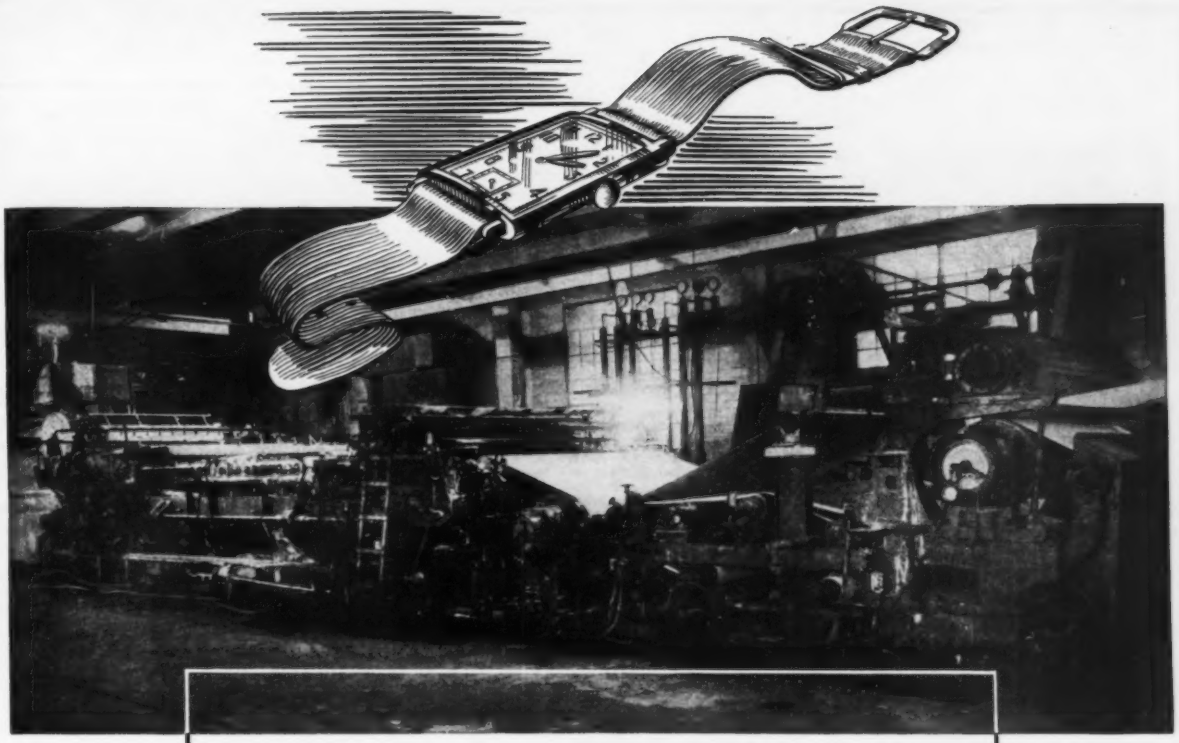

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Here is a Black-Clawson Fourdrinier machine built with uncommon care — every part so true that the entire assembly runs with the precision necessary to form condenser paper of .00025" caliper. That's the hair-splitting precision normally found only in the very finest of fine watches. Several such machines now in service — another now in process.

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Perhaps you are contemplating a new Fourdrinier, or a new vat section, or an entirely new machine for your present mill — or an entirely new mill expansion program. If so, Black-Clawson-Shartle and Dilts engineers would be glad to plan with you and submit estimates for your consideration.

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DILTS MACHINE WORKS, FULTON, N. Y.
Associate: Alexander Fleck Limited, Ottawa, Ontario, Canada

FOR SALE

1—G.E. Motor, Type 10, 75 HP, 695 RPM at full load, 2200 Volt, 3 Phase, 60 Cycle, Form "M", Serial No. 1327721.

1—CR-1034, Type NRJ3P1, 2300 Volt, 300 HP, G.E. hand starting Compensator.

1—CR-1034, Type NR2709, 2200 Volt, 200 HP, G.E. hand starting Compensator.

6—100 Amp. Fusible Safety Switches.

4— 60 Amp. Fusible Safety Switches.

30— 30 Amp. Fusible Safety Switches.

All of the above equipment is used equipment. Subject to prior sale. Please address replies to Box 46-842 Paper Trade Journal. D-12

FOR SALE

1—108" Warren 2 drum winder
1—Shower pressure pump (Belt driven)
2—Calender rolls 12" dia. 88" face, 6" journals
2—Rubber covered press rolls 18" diameter 80½" face 7" journals (1" of rubber)
1—Steam engine indicator (Thompson)
6—M. & W. expansion winder shafts
2—75 HP. Slip ring motors 3 ph. 60 cyc. 440 volts 600 rpm. with grids and rheostats.
1—Voith pulper

FRANK P. LYDEN
Ft. Edward, N. Y.
D-26

FOR SALE

Bagley & Sewall 2 drum improved winder Bronze bearings, 2 split rewinding shafts was in front of machine running 600 feet per minute making specialties. Good condition. Trims 105 inches. Address Box 46-838 care Paper Trade Journal. D-26

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FOR SALE

New brass covered felt or wire rolls 6½" dia., 84 to 120" face. These are made from government surplus and are new in all respects.

Osborne Paper Mill Equipment Co.
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WANTED

Board Machine complete, six cylinder 92 inches to 100 inches trim.

Dryers—Up to 90;—36 inch or 42 inch, 96 inches to 106 inches face. Address Box 46-777—Paper Trade Journal. D-5

FOR SALE

BEATERS
1—2000 lb. Holyoke-Iron Tub Beater.
8—1200 lb. E. D. Jones (no tubs).
1—1000 lb. Dayton Beater (no tub).
1—400 lb. Gavit—iron tub beater.
1—Dilts Breaker Beater—Bandless Roll 62" diameter x 54" face—70 tons daily capacity. Equipped with Shartle Bros. Ragger.

BLOWERS
8—Buffalo Forge Company—Size 7—Duplex Conoidal steel plate Blowers. Ball bearing.

CALENDER STACKS
1—6 roll—72" face.
1—7-roll 36" Holyoke Machine (supercalender).
1—2 roll 24" laboratory calender stack.

CENTRAP
1—Shartle Brothers Centrap.

COATING MACHINE
1—26" six roll coating machine.

CREPING MACHINE
1—86" Waldron Creping Machine, practically new. Could be used for laminating.

CYLINDER MOULDS
1—50" diameter x 74" face.
2—30" diameter x 54" face.
1—30" diameter x 75" face.
1—36" diameter x 84" face.
1—36" diameter x 80" face.
2—36" diameter x 72" face.
5—30" diameter x 72" face.

DOCTORS
14—Dillon Doctors—complete with accessories—98" face.

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1—40 h.p. Bagley & Sewall, enclosed drive.
2—30 h.p. Downingtown, enclosed drives, ratio 6 to 1.
1—Cleveland Worm Drive, Ratio 10 to 1, New.
4—Smith & Winchester mortise gear Drives.
1—Moore & White mortise gear drive.
1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM.
1—#7½ Reeves Drive.

DRYERS
16—36" diameter x 115" face. (Gears & Bearings).
1—28" diameter x 76" face.
1—48" diameter x 94" face.
1—24" diameter x 84" face. (Baby).
2—36" diameter x 64" face, with frames gears and bearings.
2—25" x 120" (Baby Dryers).
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1—36" diameter x 38" face.
5—48 x 72.
2—36 x 74. Bearings & new gears.
2—36 x 76. (Bronze). Bearings & new gears.

DRYERS
1—24 x 74 (Stainless steel).
3—24 x 72 (Copper face, textile type).
1—24 x 70 (Baby dryer).

ERKENSATORS
2—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box.

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1—4 plate Flat Screen.

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1—Lake Erie Engineering Co., 78 ton, platen 12" x 12".
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JORDANS
1—#2 Emerson, with 125 h.p. motor.
2—Noble & Wood, Pony Monarch, Belt Driven.
1—No. 9 Emerson Jordan—for direct connection to a motor.
1—Noble and Wood, Monarch, new fillings.

LIGHTER BAR LIFTS
3 sets Hydraulic Lighter Bar Lifts, with pump.

MOTOR
1—25 h.p. motor, including starting equipment.

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Various cone and assorted pulleys.

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1—32" three pocket Glens Falls Grinder (for 27" wood).

PULP SCREEN
1—IMPCO centrifugal pulp screen design No. 3.

PULPER
1—Jones Pulper.

PULVERIZER
1—Erie coal pulverizer.

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1—Buffalo Pump—5500 g.p.m. direct connected to 100 H.P. Motor (50' head).
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.
4—Vertical Schutte & Koerting Acid Pumps (with motors).

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1—2 drum reel 122".
1—72" Downingtown Expansion Reel.
1—2 Bowl Reel — 112" face — bowls 30" diameter.
1—2 Bowl Reel—110" face.

ROLLS
500—Brass tube—steel tube—rubber covered iron rolls—various sizes.

ROTARY SCREENS
3—Moore & White Rotary Screens (alternating diaphragm type).

ROTARY SCREEN
1—#2 Bird Screen (copper vat).

SAVEALL
1—Saveall 36" diameter x 96" face cylinder mold. (With iron end vat.)

SCREEN PLATES
20 Plates cut .016.
10 Plates cut .008.
Also other sizes and cuts in stock.

SHREDDERS
1—No. 25 CRSE Mitts & Merrill Hog.
1—Gilman Shredder.
1—Waterville Shredder.

SHEETERS
1—128" Moore & White Sheeter with layboy.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)
1—64" Hamblet Sheeter, layboy and 10 roll backstand.

SLICE
1—132" Beloit Slice.

SLITTERS AND WINDERS
1—72" Langston.
1—32" Cameron, Type 6.
1—36" Beck Razor Blade type Slitter & Winder.
1—60" Moore & White Slitter and Winder set for ¾" slits.
1—60" Moore & White Slitter and Winder set for 7/16" slits.

STOCK PUMPS
1—8 x 12 duplex Moore & White.
1—12 x 20 Triplex Shartle.
1—10 x 12 open impeller. (All lead).
5—Goulds Centrifugal Stock Pumps, 4 x 6, ball bearing.
1—10 x 20 Shartle Brothers Triplex.
1—8 x 12 Moore & White Triplex.
Numerous other Centrifugal Stock Pumps Advise us to your requirements.

SUCTION FELT ROLL
1—Nash 110" Suction Felt Roll.

TOILET AND TOWEL MACHINES
1—65" Towel Machine.
1—85" Toilet Machine.

TRIMMER
1—50" Seybold Trimmer.

V-BELT DRIVES
1—{23" diameter x 14" face, 10 grooves.
{15" diameter x 14" face, 10 grooves.

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1—No. 7 Sturtevant Vacuum Pump.
2—14 x 20 Connersville.
1—18 x 28 Sandusky.

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7—8" Quick Opening Stock Valves.
4—6" Quick Opening Stock Valves.

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1—84" Wet Machine.
1—74" Moore & White.

We are always in the market to purchase your surplus or idle machinery. What have you to offer? Wanted Cylinder and Fourdrinier Machines (complete mills).

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PAPER MAKING EQUIPMENT

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PAPER AND PULP MACHINERY

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AIR HOISTS
2—Two-Ton Ingersoll Rand
2—Five-Ton Ingersoll Rand

BEATERS
2—1000 lb. Horne Iron Tub.
2—1200 lb. E. D. Jones Iron Tub Beaters with washers.
2—1200 lb. E. D. Jones Beater—no tubs.
3—Valley Iron 750 lbs. Iron Tub Beaters, with Silent Link Belt Drive.
1—1200 lb. Noble and Wood—no tub. Spare new fillings for roll.
2—Valley Iron—Roll 67" diameter x 60" face—wood tub.

BIRD SCREEN PLATE
17 Plate—60 cut. New condition.

BLEACHERS
2—Fletcher high density bleachers—used 3 months.

BLOWERS
1—American ball bearing blower, size 17" x 23" for motor drive.

CALENDER DOCTORS
1 set of 16 Warren Doctors 104" face with frames.
80 Warren Doctors—various sizes.

CALENDER ROLLS
38 rolls various sizes

CALENDER STACKS
2—2 roll Holyoke 36" face.
1—Pusey & Jones 9 roll 64" face.

CONVERTING EQUIPMENT
2—Sanitary Napkin Machines. With motors and starters.
1—Bliss Double Head Stitcher.

COUCH ROLLS
2—18" diameter x 92" face—brass covered.
3—20" diameter x 92" face—brass covered.

CYLINDER MOLDS
2—Impco—84" face—40" diameter with stainless steel face wire
2—110" face x 30" dia.

DANDY ROLLS
1—122" face 10" dia.
1—138" face 12" dia.
1—129" face 9½" dia.

DRYER DOCTORS
40—Warren Doctors. Various sizes.

DRYERS
2—24" Dia. x 46" Face.
13—120" face x 48" diameter—New
1—100" face x 48" diameter—with ball bearing.
8—52" face x 27" diameter.

ELECTRIC HOIST
1—Sprague Electric 3 ton hoist—5 h.p. 3 phase—60 cycle—110 volts.

FLAT SCREENS
3—Harmon 16 plate.
1—Sandy Hill 2 plate flat screen.
1—8 plate Packer—Roller shoes.

FOURDRINIER SHAKES
1—Beloit Fourdrinier Shakes.
1—Sandy Hill Bertram Shake. Late type.

FOURDRINJER WET END
1—120" Beloit Fourdrinier Wet End.
1—74" Pusey & Jones Wet End.

HAMMERMILLS
1—American Hammermill—37" anti friction bearing equipped.
1—Williams 18" Hammermill Ball Bearing.

HOG
1—Mitts & Merrill Hog. Number 5252.

JORDANS
1—E. D. Jones Imperial Jordans—belt driven.
1—Smith & Winchester 30 ton capacity—belt driven.
1—E. D. Jones Imperial Jordan with 200 h.p. —360 r.p.m. motor.
1—Jones Standard

KNOTTERS
1—Wells Knotter.
2—Trimbey Knotters.

LINE SHAFT
1—Complete line shaft with pulleys and pillar block.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face.

PULLEYS
60—Cone Split and Solid Cast Iron Pulleys. Various Sizes.

PULP EQUIPMENT
1—125" face Kamyr Press.
1—84" Sumner Disa Barker with motor.
1—84" Carthage 4 knife chipper, 3 sets spare knives with one Watervilla Rechipper.
2—IMPCO Pulp Screens
2—Trimbey Knotters
2—Apmew Pulp Screens
2—Trimbey Screens

PULPERS
1—Voith Pulper 25 tons cap.
1—Bird Pulper.

PUMPS
3—Ingersoll Rand 250 g.p.m. 1740 rpm 90' head —4" suction—3" discharge. Direct connected to 10 hp. General Electric 220-440 volt—3 phase—60 cycle motor.
2—Ingersoll Rand 500 g.p.m. 1745 r.p.m.—80' head—4" suction—3" discharge. Connected to 15 h.p. General Electric 220-440 volt—3 phase—60 cycle motor.
4—Worthington Pumps 10,000 g.p.m.—33' head. Requires 75 h.p. at 550 r.p.m.
1—DeLaval 6" x 6".
6—Warren Vertical Pumps. 6" suction. 3" discharge. 135 g.p.m. 90' head. Direct Connected 5 h.p. General Electric motor. 1750 r.p.m. 440 volts, 3 ph.-60 cycle, ball bearing.
2—Worthington 3". 2 stage. 200 g.p.m. 224' head. Bronze Ball Bearings.
1—Worthington 400 g.p.m. 35' head 1750 r.p.m. Ball bearing.
1—Gould Figure 3000—size 8-4" suction—3" discharge.
1—American Marsh 200 g.p.m.—50' head—3" suction 2½" discharge.
1—Pennsylvania 1000 g.p.m. 80' head—8" suction—6" discharge—Connected to 30 h.p. G.E.—220 v. 3 phase—60 cycle motor.
8—De Laval Verticals—540 g.p.m. 1740 r.p.m. —30' head 5" x 5". Direct connected to 7½ h.p. Allis Chalmers Motor. 440 volts—3 phase—60 cycle.
1—6" Pusey & Jones Open Impeller Centrifugal Stock Pump—belt driven.
1—7" Pusey & Jones Open Impeller Centrifugal Stock Pump—belt driven.
1—Worthington 750 g.p.m. 120# head.
3—3" Lance Size Pumps—belt driven.
1—La Courtney 4 stage. 1000 g.p.m., 1750 r.p.m., 750' head. With base and couplings for motor.
1—La Courtney 6 stage 1200 g.p.m., 1760 r.p.m., 1180' head, with base and couplings for motor.
10—Water Pumping Units, 500 g.p.m., 270' head, 2400 r.p.m. Driven by a Chrysler Crown Gasoline Engine and mounted on a two wheel trailer.
1—Terry Marsh 750 g.p.m., 250' head. Requires 125 h.p. motor.
2—Ingersoll Rand all bronze 175 g.p.m.—40' head.
1—Worthington 3"—200 g.p.m.—3550 r.p.m.—480' head.

REFINERS
1—Weiner Refiner 24" with extended base for direct connection to motor.

ROLLS
40—Table, Dress, Felt, Wire, Breast and Calender Rolls. Various Sizes.

ROTARY SCREENS
2—#2 Bird with copper vats.
2—#1 Bird with steel vats, lead lined.
4—Moore & White.

RUBBER PRESS ROLLS
1—109" Face—17½" Diameter.
1—120" Face—19" Diameter.
1—107" Face—18" Diameter.
1—106" Face—18¼" Diameter.

SCREW PRESS
1—Valley Iron Screw Press. Used 2 years.

SHEETERS
1—96" Hamblet Duplex.
1—136" Hamblet Duplex.

SHREDDERS
2—24" Sprout Waldron heavy duty shredders—anti friction bearing equipped.
1—Taylor Stiles Portable Pulp Shredder—on wheels.
1—Rythor and Pringle Shredder.
3—36" Mitts & Merrill with 125 h.p. motors and starters

SLITTERS AND WINDERS
1—41" Waldron Slitter and rewinder. Roll embossing attachment.

STEAM LOCOMOTIVES & WOODLAND EQUIPMENT
1—32 ton 36" gauge Shay-Lima locomotive. Air pressure 150 lbs. P.S.I. with a large lot of new spare parts.
1—40 ton 36" gauge Improved Climax Locomotive. Boiler pressure 150 lbs. P.S.I. with a large lot of new spare parts.
30—36" gauge wood cars. 40,000 lbs. log or pulpwood capacity. Used 4 months.
1—Sheffield motor car, manufactured by Fairbanks Morse—36" gauge—New.

STOCK PUMPS
1—8 x 18" Beloit Duplex.

STONITE PRESS ROLL
1—Stowe Woodward 111" face x 22" diameter.

SUPERCALENDER STACKS
1—7 roll Norwood—52" face.

TURBINES
1—Westinghouse 125 h.p. 125 steam pressure—15 back pressure. Complete. Used 1 year.

VACUUM PUMPS
2—14" x 20" Connersville.

YANKEE DRYERS
2—Beloit 8' dia. x 175" face—75# working pressure.
1—Beloit 5' dia. x 194" face—75# working pressure.

THE ABOVE IS A PARTIAL LIST OF EQUIPMENT OFFERED FOR SALE.

NO CONNECTION WITH ANY OTHER FIRM OF SIMILAR NAME.

FOR SALE

1—54" Seybold Holyoke Mill Type Cutter. Independent, automatic clamp. Flat Power Back Gauge. 5 h.p. a.c. motor. Rebuilt and guaranteed.
1—Modern Clipper Cellophane Bag Machine.
1—92" Dillon Duplex Rotary Sheet Cutter with slitting attachment, Brannan Ream Folder and 25 roll backstands.
6—Potdevin and
1—Lockport flat and square bag machines, complete with motor equipments making bags from ¼ to 25 pounds.
1—84" Hamblet Standard Single Rotary Sheet Cutter with slitting attachment.
1—36" Norwood Plater. 15 h.p.—A.C. motor—pulley drive. Excellent condition.
1—Noble & Wood Pony Jordan with extra new filled plug. ⅞" steel fillings.
3—Lockport Flat and Square Bag Machines making bags from 4 to 24 lbs., also SOS Bag Machines making 1, 2, 3, 7, 8 & 10 lb. bags.
1—42" 3 roll Friction Calender, two steel rolls, one cotton roll.
1—52" 9 roll Holyoke Super Calender, 5 steel and 4 cotton rolls. Revolving reel and motor equipment. Push button control.
1—53" 7 roll Textile Machinery Co.'s Super Calender. Roller bearings. Revolving reel and motor equipment. Push button control.
1—52" Waldron Brush Coater. Festoon equipment, five Buffalo Blowers, winding reel. Motor equipments.
1—58" Crahl & Hoehl Brush Coater. Festoon equipment. Five Buffalo blowers. Winding reel. Motor equipments.
1—60" Waldron Brush Coater. Festoon equipment. Six Buffalo Blowers. Winding reel. Motor equipments.
1—64" Waldron Brush Coater. Festoon equipment. New J. O. Ross Drying Oven. 5 Buffalo Blowers. New winding reel. Motor equipments.
1—Sheridan Die Press 27x44"—rebuilt.
1—Logeman Die Press 10x30"—rebuilt.
4—Complete spiral tube winders with automatic cut-offs, also recutters. 2 Langston and 2 Knowlton manufacture.
6—Rotary Embossing Machines: 1—33", 4—34" and 1—44".

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y.
TF

MACHINERY FOR SALE

3—Impco Pulp Screens of design No. 8.

3—Gould, size 8", double suction centrifugal pumps mounted on baseplates but without motors. These pumps are Fig. 3450, rated 1000 GPM at 25 ft. head and require a 15 HP 1200 RPM motor. One pump is new and one pump is slightly used but in good condition.

3—Saranac Oyster-pail machines, hopper feed.

2—Saranac Butter-dish machines, hopper feed.

STEVENS & THOMPSON PAPER COMPANY
Greenwich, New York
TF

FOR SALE
NEW AND COMPLETE

Steam Power Plant Equipment, consisting of 2—80000 lbs. per hour 625 psig pulverized coal fired boilers with pulverizers; fans; feed water heater; pumps and controls; dust collector system; pneumatic ash conveyor system; motors and turbine drives. Also 1—5000 Kw bleeder type turbo generator 600 psig initial, extracting at 150 psig and 20 psig, with 4000 sq. ft. surface condenser and 2—2000 Kva transformers and switch gear. Address Box 46-815 care Paper Trade Journal D-12

FOR SALE

Two—12 plate Bagley & Sewall flat screens in good condition.

One—120" heavy duty Langston Winder.

Both can be seen running until January 1st.

MUSKINGUM FIBER PRODUCTS CORP.
Coshocton, Ohio D-21

FOR SALE

FRANK H. DAVIS CO.,
ESTABLISHED 1889
USED AND REBUILT PAPER MACHINERY

FOR SALE

BEATERS
2—Holyoke 66 x 60 iron tub
1—Holyoke 48 x 44 iron tub
1—Horne patent beater 80 x 60, bronze bars
1—2000 lb. Horne iron tub new 1941, bandless roll 60 x 48
CALENDERS
1—52" Textile seven roll supercalender
1—43" Holyoke seven roll supercalender
5—Paper rolls 76 x 15¾ Jour. 7¾ x 13¾"
CUTTERS
1—110" Hamblet duplex sheet cutter
1—84" Clark with Moore & White layboy
1—Taylor Stiles rag cutter
2—No. 2 Daniels rag cutters
1—63" Smith & Winchester undercut ream cutter
1—115" Single knife Moore & White cutter and slitter, also layboy
DECKERS
1—30 x 95" Black & Clawson
1—36 x 74" Impco
3—Apmew filters, mould 50 x 100"
DRIVES
6—Beloit 14 & 63 teeth
7" face C O mortise gears
DRYERS
1—8 ft. x 86"
2—8 ft. x 175"
1—6 ft. x 102"
1—5 ft. x 194" new 1939
1—6 ft. x 106"
DUSTERS
1—four cyl. R.R.
1—Devil
FANS
Two—Buffalo double turbo 6½ concoidal forced draft fans
ENGINES
1—Hamilton Corliss 10 x 30 direct connected to 30 KW Westinghouse engine generator including exciter, balance wheel 10 ft. x 11"
1—10 x 10 American Ball twin variable speed, 100 HP excellent condition
FOURDRINIER PARTS
1—119" x 54' 10" wire
Rice Barton anti friction equipped
19" breast and 18" suction couch, now running
1—120" x 75 ft. wire Horne new 1927, anti friction equipped 25" suction couch and Bellit oscillating suction boxes. Also two sets Horne heavy presses with 20" dia. rolls. Now running 450 FPM
1—133" x 61' 2" wire Pusey & Jones, plain couches, running at 500 FPM
1—100" x 31 ft. special with two Reeves drives
1—72" Sandy Hill
1—120" Voith inlet
2—Sets 10" slices
FILTERS OR DE-INKERS
1—Apmew three cylinder, mould 50 x 100", worm gear drive
MIXERS AND COOKERS
1—25 gallon cooker, No. 75
PULPERS
1—No. 1 Lannoye
2—Jones with Falk reducers and motors 440 volts 3 p. sixty cycle
PUMPS
1—10 x 10 Bellit triplex
2—10 x 12 Deane rebuilt
1—Ingersoll Rand Pump, type Imperial 10
REELS
1—Two bowl Beloit, drums steel 16 x 123, slip belt drive
SCREENS
2—No. 2A Bird
2—No. 2 Bird
1—Moore & White No. 3
1—Jones Leith Walk
2—12 plate Packer
4—New 10 plate Witham vats
SHREDDERS
2—Mitts Merrill No. 15 CF direct cont. to 125 HP 440 volt motor
1—Carthage
Mitts Merrill type 14A F E S No. C 19026
SORTING TABLE
1—Moore & White sorting table
SLITTERS AND WINDERS
1—158" Moore & White four drum
1—120" Kidder two drum
1—114" Moore & White winds 50" roll
1—84" Bagley & Sewall
1—50" Cannard
1—26" Kidder two drum
1—38" Langston
WASHERS
2—2000 lb. Union Machine steel tub
Apmew three cylinder
WET MACHINES
1—84" Noble & Wood, automatic cut off
Bottom roll R.C. 24 x 88"

Builders of
ASPHALT COATING, COMBINING MACHINE, GUMMING AND CREPING MACHINE, ROLL GRINDER

FRANK H. DAVIS COMPANY
175 Richdale Ave., Cambridge, Mass.
TF

FOR SALE

REVAMPING AND REBUILDING MILL AND CAN OFFER FOR SALE

Carrick Combustion controls for two boilers to be sold as unit.
1—Noble & Wood Mammoth Jr. Jordan ¼" Filling.
1—Brass covered finishing press roll 17¾" dia. x 89½" face complete with bearings and Noble & Wood friction drive.
1—4000# capacity motor driven freight elevator with automatic stop control—can be inspected in operation at our plant.
2—8" Barnes centrifugal sewage pumps.
10—100" screen plates for No. 2-A Bird Screen. Slots .022—never used after being recut once.
1—Brass covered press roll 111½" dia. x 68" face—journals 4-13/16" dia. x 7½" long.
1—Rubber covered press roll 13" dia. x 86¼" face—journals 4-15/16" dia. x 10½" long.
11—20" face cast iron tapered pulley—2-15/16" bore, taper 31"-29½"
2—20" face cast iron tapered pulleys—3-7/16" bore, taper 31"-30"
1—20" face cast iron tapered pulley—3-15/16" bore, taper 30"-28½"
1—24" face cast iron tapered pulley—3-7/16" bore, taper 31¾"-29¾"
2—Steel split pulleys 60" dia. x 31" face x 5-15/16" bore.
2—Steel split pulleys 60" dia. x 41" face x 5-15/16" bore.
1—Cast iron split pulley 60" dia. x 21" face x 3½" bore.
1—Cast iron split pulley 40½" dia. x 21" face x 3½" bore.
1—Cast iron split pulley 84" dia. x 30" face x 5-15/16" bore.
1—Cast iron split pulley 72" dia. x 18" face x 8¾" bore.
1—Paper pulley 24" dia. x 21" face x 4½" bore.
1—8½" dia. x 85" face rubber covered squeeze or wringer roll—Journals 1-15/16" dia.
1—9" dia. x 88" face calender roll—5" dia. journals.
12—6½" dia. x 92" face steel drier felt rolls with 1-7/16" x 6½" journals.
2—Pair Noble & Wood lighter stands complete with lighter beams and bearings for 8" dia. journal beater roll.
1—Rubber covered roll 17¾" dia. x 89" face, journals 4½" dia. x 9" long with Noble & Wood friction drive.

A visit to the mill would prove profitable as we have many items for sale too numerous to mention. See our superintendent, Mr. O. P. Fussell at our plant in Walloomsac, N. Y.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
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PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Carbon, Laboratory Coating and Treating Machines. High speed. New improvement. MAYER MACHINE COMPANY, Inc., 1155 Scottsville Road, Rochester, 11, N. Y. TF

FOR SALE—1—Economy 1,000# Capacity Electric Tiering Machine; 1—Economy 1,500# Capacity Electric Tiering Machine. Both equipped with: 3 h.p., 230 Volt, D-C Roth Motor. Address Box 46-726 care Paper Trade Journal. D-12

FOR SALE — 2 — Quadruple Effect Vertical Body Evoporators; 3—Rotary Dryers, 7½' x 65', 7' x 70', 7½' x 130'; 2 Rotary Digesters. Full details upon request. BRILL EQUIPMENT COMPANY, 225 West 34th Street, New York, 1, N. Y. D-5

FOR SALE—Reeves Drives, one No. 3 and one No. 6. THE CORRUGATED CONTAINER COMPANY, Columbus, OHIO. D-5

FOR SALE — Complete Poirier Suction Box Vacuum Control System, practically new. Address Box 46-840 care Paper Trade Journal. D-26

FOR SALE—50" Seybold Automatic Clamp Cutter, thoroughly rebuilt and fully guaranteed. Address Box 46-847 care Paper Trade Journal. D-5

FOR SALE—One 38" two color Rotogravure Press. Sheet feed and pile delivery. Practically new. Address Box 46-541 care Paper Trade Journal. TF

FOR SALE—One 60" dia. x 54" face steel plate surface dryer drum. Surface ½" thick. 5" journals. Address Box 46-818 care Paper Trade Journal. D-12

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IN PITTSBURGH
FOR REBUILT ELECTRICAL EQUIPMENT

M-G SETS—ROTARIES (3 ph. 60 cy.)

640 KW Al. Ch. 250 v.—800 HP Syn. 2300
500 KW West. Rotary 6 ph. 2 ped. brg. 1200 RPM with Transformers.
300 KW G.E. Rotary 2 ped. brg. 6 ring.
200 KW West. 250 v.—300 HP West. Ind.
50 KW G.E. 125 v.—75 HP West. 220/440 v.
45 KW West. SK 125 v.—75 HP West.
15 KW Wotten 125 v.—25 HP Wotten 220

A.C. & D.C. GENERATORS

200 KVA West. AC 440/220/3/60 600 RPM.
1250 KVA West. A.C. 440/3/60 1200 RPM New.
2—35 KW West. SK 250 v. 1050 RPM.
2—40 KW West. S 250 v. 1150 RPM.
45 KW West. SK 125 v. 700 RPM.
75 KW West. S 250 v. 1000 RPM.
70 KW G.E. 250 v. 1250 RPM.
1000 amp. 60 volt Westgh. SK Welding Gen.

AIR COMPRESSORS

1300 cu. ft. 100# pres. Worthington 2 stage, 20 & 12x16 Belted with Intercooler and Unloader.
500 cu. ft. 110# Worth.—100 HP West.
270 cfm 100# Chg. Pne. Gas. Portable.
220 cfm 100# Ing. Rd. Gas. Portable.
175 cu. ft. 100# pres. Chic. Pneu. 9x8.
1—164 cu. ft. Ch. Pneu. Steam Type.

AC MOTORS (3 ph. 60 cy.)

HP	Make	Wdg.	Spd.	Type
200	West.	S. C.	600	CS
1250	West.	Syn.	1200	NEW
500	G.E.	Sl. rg.	450	MT 412
450	G.E.	Sl. rg.	257	I-M
350	G.E.	Sl. rg.	900	I-M
300	West.	Sl. rg.	1750	CW
250	Al. Ch.	S. C.	1200	
200(2)	G.E.	Sl. rg.	240	MT 412
150	West.	Syn.	600	
145	G.E.	Syn.	900	ATI
100	West.	Sl. rg.	1800	CI
50	G.E.	Sl. rg.	900	I-M
40(3)	G.E.	Sl. rg.	600	MT 346
40	G.E.	Sl. rg.	900	MTC

REDUCTION UNITS

500/700 HP Morse Chain Drive—4.28 to 1.
250 HP Ottumwa Unit 12½ to 1.
150 HP Nuttall 1.6 to 1.
150 HP G.E. Unit ratio 3 to 1.
50 HP Ohio Forge & Mche. Co. Ratio 45:1.
50 HP W. Ganschow Co. Ratio 45:1.

D.C. MOTORS

HP	Make	Voltage	Wdg.	Speed
10	G.E.	230	ser.	875
13	West. SK113	230 Enc.	cp.	850
15	West. SK93	230	sh.	825
15	West. S5	230	cp.	1000
25	West. SK113	230	cp.	825
31	G.E. C02002E	500	ser.	710
40(2)	West.	230	cp.	775
40	West.	230	cp.	825
40	Roth 126RS	230	cp.	1700
50	Rel. 185T	320	sh.	1500
50	West. S8L	230	sh.	1700
70	G.E.	230	cp.	950
75	West. S12L	230	cp.	670
100	G.E. MD108	230	ser.	480
100	West. SK	230	—	400/800
175	G.E. MDS109¼	230	ser.	475

ENGINE & TURBINE UNITS

125 KVA Allis-Terry Turbo 440/3/60 3600 RPM.
50 KW West.—Turbo 125 v.
150 KVA GE 220/440/3/60—Erie Ball Steam.
250 KW Cr. Wh. Skinner Una. 250 v.
500 KW 250 v. G.E.—Terry mixed pres.
2—1250 KW .8 P.F. 2400/3/60 G.E. Curtis.
2500 KVA GE 2300/3/60 RPM.

Electrical Engineers—Specializing in Rebuilt Electrical Machinery for over a Quarter of a Century

MOORHEAD-REITMEYER CO., INC. — Pittsburgh 19, Pa. — Phone Mayflower 7900

FOR SALE

1—130" Voith inlet
19—dryers 36 x 95"
1—143" heavy duty calender stack
2—108" heavy duty calender stacks
Several good modern heavy duty box type calender frames.
8—Variable speed engines—various sizes
1—114" Silicate board paster
1—140" heavy duty Beloit duplex cutter
1—115" Beloit duplex cutter
1—160" Moore & White heavy duplex cutter
1—109" Hamblet heavy duty duplex cutter
2—#2 Bird screens
1—115" Moore & White four-drum winder
1—76" Moore & White four-drum winder
1—115" Warren winder
1—108" Fourdrinier part
12—dryers 48 x 106
1—48" Hamblet layboy
1—77 x 48 Erie layboy
Lot various sized gate valves
1—600 ton Hydraulic press with accumulator, high and low pressure pumps, conveyor, turn table and layboy

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Middletown, Ohio
D-12

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FOR SALE

22—Closed redwood tanks, 22' dia. x 20'6" high, 50,000 gallons each.

5—Closed redwood tanks, 16' dia. x 16' high, 25,000 gallons each.

All the above are 3" in thickness, complete with round hoops and lugs, used a short time for water, like new.

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A large quantity of new aluminum, galvanized and black steel A.P.I. bolted type closed tanks, complete with gaskets and bolts from 250 to 10,000 barrel capacity.

● ● ● ● ● ● ● ● ● ● ● ●

A great number of high pressure and other steel tanks of all dimensions, sizes and capacities. New and guaranteed used steel pipe and tubing up to 36" inclusive. Also valves and fittings.

Send for our new lists. We appreciate your inquiries.

JOS. GREENSPON'S SON PIPE CORPORATION
National Stock Yards, St. Clair County, Ill.
D-5

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WANTED

WANT TO PURCHASE

A party is interested in purchasing a paper jobbing business having an established trade, located preferably in the East. Arrangements could possibly be made to continue present owner as manager and retain present employees. All information will be held in strict confidence. Address Box 46-833 care Paper Trade Journal. D-5

FOR SALE

FOR SALE—Cellophane. Available in small cut size sheets, either moistureproof or plain. Fairly prompt delivery. Address Box 46-603 care Paper Trade Journal. TF

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24". Also Triple-Deck Frames for ninety 36" dryers, any width. The Chesapeake Paperboard Co. Baltimore 30, Md TF

FOR SALE

62" Beloit Cut-Off Knife for Paster or Corrugator with Slitters
63" Langston Single Face Corrugator
60" Clark Aiken Sheeter
96" Guillotine Board Cutter
56" and 43" Miehle Print. Presses
68" x 46" Sheridan 4 Post Die Cutter Model 25
ALSO SLITTERS; REWINDERS; PAPER CUTTERS; COATERS; PRINTERS; DIE CUTTERS; WINDOW CELLOPHANE GLUERS; SCORERS; CREASERS; STITCHERS; STAYERS; ENDERS; SLOTTERS; WRAPPERS & GLUERS.
Write for Bulletins listing over 70 PAPER BOX and CONVERTING MACHINES now available.

SOUTH WABASH ENGINEERING CO.
2929 S. Wabash Ave., Chicago, Illinois J-2

FOR SALE

2—Brownell Twin High Pressure Engines — 250 h.p. each — 260 r.p.m.—size 14 x 16".

1—Hamilton Corliss Engine—200 at 120 r.p.m. size 18 x 36".

1—Fulton Iron Works Corliss Engine—200 h.p. at 100 r.p.m. size 14 x 42 engines.

J. J. ROSS COMPANY
250 Frelinghuysen Ave. Newark 5, N. J.
Tel. Bigelow 3-3720 D-5

WANTED

MACHINERY WANTED

2 or less Cylinder Molds 36" dia. 80" face 20" Journal 2⅞" with Anti-friction Bearings.

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WANTED—New or used paper working and allied machinery for export.

POTDEVIN EXPORT CORPORATION
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WANTED

WANTED

Side rolls odd lots of any kind of paper in rolls 12½" and wider any color, preferably white, also printed with any design. All grades.

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BLEYCO PAPER CORP.
214 Sullivan St., New York #12
D-26

WANTED

Ground wood plant for 10 to 12 tons for shipment to foreign country, or will consider grinder and motor.

SHARTLE BROS. MACHINE CO.
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PAPER MANUFACTURER desires to purchase or invest in converting business of standard paper products. Address Box 46-708 care Paper Trade Journal. TF

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic Presses, Sheridan Presses, Dryers. Address Box 46-32 care Paper Trade Journal. TF

WANTED — DISCARDED PAPER MILL FELTS. HIGHEST PRICES paid for all kinds of discarded paper mill felts. LARGE or SMALL QUANTITIES accepted. Prices quoted immediately on receipt of samples. ADDRESS GLASER AND YOFFE, INC., 80 NORTH MAIN ST., NATICK, MASS. TF

WANTED—Paper Board Machine, capable of producing 35 to 100 tons folding box board daily. Replies held in strictest confidence. Address Box 46-651 care Paper Trade Journal. TF

WILL TRADE PAPER FOR BOARD—Available: Our 60 pound white coated Litho paper in rolls, carloads or less—for board. .016 to .050 in rolls—or sheets in any caliper, or grade. Address Box 46-845 care Paper Trade Journal. D-19

WANTED—2—72" cylinder moulds 36" diameter with vats and press rolls; also couch rolls; also slitter and rewinder 72"—#2 Nash Vacuum Pump. Address Box 46-844 care Paper Trade Journal. D-5

WANTED—Second hand Schopper Tensile and Folding Tester—motor or hand operated. Address Box 46-843 care Paper Trade Journal. D-12

WANTED—SEYBOLD CUTTERS with capacity of 44" or over. CAMERON ELECTRIC EYE SPOOLERS Model No. 24 or Model No. 2D, and KRAUSE DIE CUTTERS. Write or wire Reynolds Metals Co., Engineering Division, Richmond, Virginia. J-9

WANTED

WANTED—Guillotine Cutter, also Beck sheet cutter any size. Address Box 46-825 care Paper Trade Journal. D-5

WANTED—Brightwood Box Machine. Address Box 46-33 care Paper Trade Journal. TF

WANTED—SEYBOLD CUTTERS with capacity of 44" or over, CAMERON ELECTRIC EYE SPOOLERS Model No. 24 or Model No. 2D, and KRAUSE DIE CUTTERS. Write or wire Reynolds Metals Co., Engineering Division, Richmond, Virginia. J-2

GOVERNMENT BIDS

PROPOSALS

FOR FURNISHING

PAPER AND ENVELOPES FOR THE U. S. GOVERNMENT PRINTING OFFICE

SEALED PROPOSALS will be received until 10 a. m., December 16, 1946, in the room of the Joint Committee on Printing, in the Capitol, Washington, D. C., for furnishing the paper for the public printing and binding, and blank paper and plain envelopes for the use of the Government departments and establishments in the District of Columbia, for the terms of 3 months for paper and 6 months for envelopes beginning January 1, 1947, deliveries to be f. o. b. Government Printing Office Warehouse, or warehouse siding, Washington, D. C. The proposals will be opened in the presence of and the award of contracts made by the Joint Committee on Printing to the lowest and best bidders for the interest of the Government whose bids are in conformity with the requirements of the proposals. The Committee reserves the right to reject any or all bids, or to accept any bid or any part and reject the other part, if, in its opinion, such action would be in the interest of the Government.

Blank proposals containing the instructions, schedule, and specifications, may be obtained by addressing A. E. Giegengack, Public Printer, Washington, D. C.

Contracts will be entered into for supplying the quantities required, whether more or less than the estimates, as provided in paragraph 15 of the proposal for paper and paragraph 13 of the proposal for envelopes.

The approximate estimated quantities set forth in detail in the schedules comprise:

PAPER

3,600,000 pounds newsprint paper; 200,000 pounds catalog news paper; 1,150,000 pounds machine-finish book paper; 100,000 pounds English-finish book paper; 1,400,000 pounds offset book paper; 350,000 pounds offset poster paper; 200,000 pounds antique book paper; 50,000 pounds 50% lightweight machine-finish book paper; 50,000 pounds 50% antique book paper; 900,000 pounds supercalendered book paper; 650,000 pounds coated book paper; 550,000 pounds mimeographed paper; 140,000 pounds duplicator copy paper; 150,000 pounds U S M O safety writing paper; 8,090,000 pounds writing paper; 50,000 pounds map paper; 330,000 pounds manifold paper; 2,250,000 pounds bond paper; 775,000 pounds ledger paper; 1,150,000 pounds index paper; 150,000 pounds cover paper; 130,000 pounds manila paper; 400,000 pounds kraft paper; 25,000 pounds blotting paper; 5,000 pounds high-finish red sulphite paper; 130,000 pounds tag board; 50,000 pounds manila board; 65,000 sheets railroad board; 220,000 pounds wood cardboard; 40,000 pounds chemical wood tan board; 4,450,000 pounds postal card paper; 150,000 pounds news board; 120,000 pounds binder's board.

In cases where more than 1,000 reams are called for, proposals will be received for 1,000 reams or more.

ENVELOPES

The approximate estimated quantities set forth in detail in the schedule comprise:

13,450,000 Kraft; 6,500,000 Writing, Chemical Wood, white and colored; 115,000 100% Writing, white; 650,000 25% Bond, white; 420,000 100% Bond, white.

By direction of the Joint Committee on Printing.
A. E. GIEGENGACK,
Public Printer.

WASHINGTON, D. C.,
November 25, 1946. D-12

SALES AGENCY

WELL ESTABLISHED FIRM in Shanghai with years of experience in paper business desires to contact American Mills or exporters of paper, board or pulp; interested to be appointed agents in China. Write Paper Dept., P. O. Box 1172, Shanghai, China. D-12

MISCELLANEOUS

WILL EXCHANGE board for laminating, mounting, lining and die-cutting machinery. Address Box 46-707 care Paper Trade Journal. TF

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Steam, Hydraulic and Electrical Engineering
Process Studies, Design, Specifications and Engineering Supervision
Reports, Consultation, and Valuations

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Paper and Pulp Mills, Hydro-Electric and Steam Power Plants
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BROAD EXPERIENCE IN MANUFACTURE OF PULP AND PAPER
SPECIALIST IN PLANT DESIGN
SURVEYS OF MILLS AND PROCESSES
CONSULTATION ON TECHNICAL PROBLEMS
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Consulting Engineers
200 FIFTH AVENUE, NEW YORK CITY
Hardy S. Ferguson.....Member A.S.C.E., A.S.M.E., E.I.C.
Glenn H. Yeaze.....Member A.S.M.E., E.I.C., A.S.C.E.
Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of
Pulp and Paper Mills and other Industrial Plants
Steam and Hydro-Electric Power Plants
Dams and Other Hydraulic Structures

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Complete Service
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PULP AND PAPER MILLS—PLANTS AND FACILITIES.
DESIGN, CONSTRUCTION, MODERNIZATION

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GLENS FALLS N.Y.
PULP SCREENS
WEIGHT AND CONSISTENCY REGULATORS
METERING SYSTEMS — FLOAT VALVES

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INCORPORATED
415 LEXINGTON AVENUE
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The Paper Industry
Since 1929
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Greenville, South Carolina — Established 1902
PAPER & PULP MILLS • WASTE DISPOSAL • TEXTILE MILLS •
APPRAISALS • WATER PLANS • STEAM UTILIZATION •
STEAM POWER PLANTS • HYDRO-ELECTRIC • REPORTS

THE MAYER MACHINE COMPANY, INC.
Manufacturers of
Paper Coating Machines
1155 Scottsville Road, Rochester 11, N. Y.
Waxing & Oiling, Carbon, Laboratory, Flat Room Converting and Measuring and Roadmarking.

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THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT 7, MICH.

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Manufacturers of Felts of Superior Quality
for Every Grade of Pulp and Paper
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Any Rawstock can make Clean Paper

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You can prove in your own mill that:

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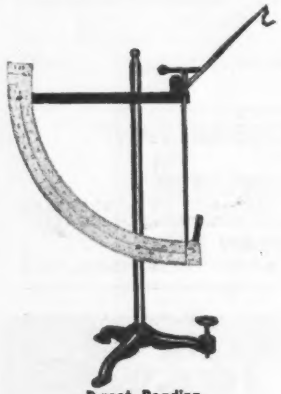
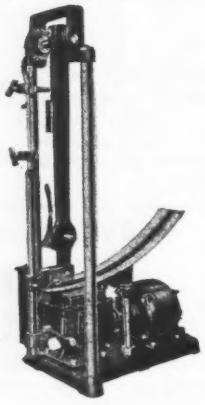


Direct Reading Paper Scales
Full Size Sheet & Reduction



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Tachometers (Stationary & Hand)

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Monsanto Chemical Co.
Norton Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division

ADHESIVES
American Anode Incorporated
American Resinous Chemicals Corp.
Arabol Mfg. Co.
Casein Company of America
Flintkote Company
Kelco Company
Monsanto Chemical Co.
National Adhesives Division of National Starch Products, Inc.
Philadelphia Quartz Co.
Stein, Hall & Co., Inc.
United States Rubber Co.

AGITATORS
Appleton Machine Co.
Biggs Boiler Works Co.
Dilts Machine Works, Inc.
Dorr Company
Downingtown Mfg. Co.
Hardinge Co., Inc.
Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Montague Machine Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

AIR CONDITIONING
Spray Engrg. Company
Steamaire Company

ATOMIZERS
Steamaire Company

BAG MACHINES
Potdevin Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Weber, Herman G.

BALING MACHINES
Thomas W. Hall Co.

BARKERS AND CHIPPERS
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Carthage Machine Co.
Fibre Making Processes, Inc.
Holyoke Machine Company
D. J. Murray Mfg. Co.
Valley Iron Works Co.

BARS
Dilts Machine Works, Inc.
E. D. Jones & Sons Co.
The Moore & White Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BEARINGS
Black-Clawson Company
Jones, E. D., & Sons Co.
Magnus Metal Corp.
Montague Machine Works
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Rollway Bearing Co.
Shartle Brothers Machine Co.
SKF Industries, Inc.
Timken Roller Bearing Co.
Valley Iron Works Co.
T. B. Wood's Sons Company

BEATERS & JORDANS
The Appleton Machine Co.
Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Hermann Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
J. J. Ross Company
Ross Paper Machy. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

BED PLATES
Bahr Brothers Mfg. Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BELTING
Alexander Brothers
Allis-Chalmers Mfg. Co.
The Cincinnati Rubber Mfg. Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
J. E. Rhoads & Sons
United States Rubber Co.
T. B. Wood's Sons Company
Worthington Pump & Machy. Corp.

BLEACHING BOILERS, ROTARY
The Biggs Boiler Works Co.

BLEACHING APPARATUS
The Biggs Boiler Works Co.
Improved Paper Machy. Co.
E. D. Jones & Sons Co.
Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
Noble & Wood Machine Co.
Pennsylvania Salt Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Carthage Machine Co.
Montague Machine Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOILERS
Babcock & Wilcox Co.
Biggs Boiler Works
Foster Wheeler Corp.

BOILERS (Electric)
Steamaire Company

BOTTOMS
Harrington & King Perforating Co.
Kalamazoo Tank & Silo Co.
Valley Iron Works Co.

CALENDERS
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
Holyoke Machine Company
Lobdell Car Wheel Co.
Moore & White Co.
Perkins & Sons, Inc., B. F.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CASEIN
Casein Company of America

CASTINGS
Appleton Machine Co.
Black-Clawson Company
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Grinnell Company
Hamblet Machine Co.
Hardinge Co., Inc.
E. D. Jones & Sons Co.
Lobdell Car Wheel Co.
Magnus Metal Corp.
Montague Machine Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Union Machine Company
Union Screen Plate Co.
Valley Iron Works Co.
Walworth Company

CENTRIFUGAL MACHINERY
Bird Machine Co.
De Laval Steam Turbine Co.
Nichols Engrg. & Research Corp.
Ross, J. O., Eng. Co.
Shartle Brothers Machine Co.
Williams Apparatus Co.

CHEMICALS
American Anode, Incorporated
Amer. Cyanamid & Chem. Corp.
Amer. Resinous Chemicals Corp.
Ansul Chemical Co.
Calco Chemical Co.
Calgon, Inc.
The Cowles Detergent Co.
Diamond Alkali Co.
Dispersion Process, Inc.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
Falls Chemical Products Co.
General Dyestuffs Corp.
Geigy Co., Inc.
Gottesman & Co.
Hooker Electrochemical Company
Kelco Company
The Kinsley Chemical Company
Mallinckrodt Chemical Works
The Mathieson Alkali Works, Inc.
Monsanto Chemical Company
National Oil Products Co.
Naugatuck Chemical Div. of U. S. Rubber Co.

WHERE TO BUY

Niagara Alkali Company
Paper Makers Chemical Department, Hercules Powder Co.
Pennsylvania Salt Mfg. Company
Philadelphia Quartz Co.
Pioneer Salt Company
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
United States Rubber Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

CLEANING MATERIALS
Adell Chemical Company
Amer. Cyanamid & Chem. Corp.
Bird Machine Co.
The Cowles Detergent Co.
E. I. du Pont de Nemours & Co., Inc.
Paper Makers Chemical Department Hercules Powder Co.
Magnus Chemical Co.
Monsanto Chemical Co.
Nichols Engrg. & Research Corp.
Oakite Products, Inc.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
Wyandotte Chemicals Corp., J. B. Ford Division

CLUTCHES
Appleton Machine Co.
Black-Clawson Company
Hudson Sharp Machine Company
Farrel-Birmingham Co.
Fawick Airflex Co., Inc.
Hardinge Co., Inc.
Holyoke Machine Company
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Stearns Magnetic Mfg. Co.
T. B. Wood's Sons Company

COATING MACHINERY
Hudson Sharp Machine Company
Mayer Machine Co.
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corporation, John
Weber, Herman G.

COCKS, LUBRICATED PLUGS
American Car & Foundry Co.

COMPRESSORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Ingersoll-Rand Co.
Nash Engineering Co.
Worthington Pump & Machy. Corp.

CONDENSERS
Foster Wheeler Corp.

CONSULTING ENGINEERS
Frederic C. Clark
Ferguson, Hardy S.
Hardy, George F.
Alvin H. Johnson & Co., Inc.
The Kohler System Company
Main, Inc., Chas. T.
The MacPherson Company
Roderick O'Donoghue
The Rust Engrg. Co.
J. E. Sirrine & Co.
South Wabash Engrg. Co.
Stone & Webster Engrg. Corp.

CONTROLLERS
Black-Clawson Co.
Cochrane Corp.

CONTROLS
The Bristol Company
Cochrane Corp.
Stickle Steam Specialties Co.

CONVEYORS
Black-Clawson Company
Murray, D. J., Mfg. Co.
Ross Engineering Corp., J. O.

COOKING PROCESSES
The Kinsley Chemical Company

COOLING SYSTEMS
Foster Wheeler Corp.
Steamaire Company

CORES
Elixman Paper Co.
Rodney Hunt Machine Co.
Montague Machine Co.
Smith & Winchester Mfg. Co.
Sonoco Products Co.
Walker-Goulard-Plehn Co.

COUPLINGS
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co., Inc.
Hardinge Co., Inc.
E. D. Jones & Sons Co.
Lovejoy Flexible Coupling Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
Westinghouse Electric Corporation
T. B. Wood's Sons Company

CRANES
Northwest Engrg. Co.
Reading Chain & Block Company

CRUSHERS
Fibre Making Processes, Inc.

CUTTERS
Dilts Machine Works
Thomas W. Hall Co.
Noble & Wood Machine Co.
Perkins & Son, Inc., B. F.
The Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Taylor Stiles & Co.

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Perkins & Son, Inc., B. F.
Steamaire Company
Valley Iron Works Co.

DE-INKING
Adell Chemical Company
Dilts Machine Works
Hardinge Co., Inc.
Kinsley Chemical Co.
Shartle Brothers Machine Co.

DIGESTERS
Biggs Boiler Works Co.
Foster Wheeler Corp.
Pusey & Jones Corp.

DOCTORS
Bird Machine Company
Black-Clawson Company
Downingtown Mfg. Co.
Lobdell Co.
Lodding Engineering Corp.
Montague Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.

DOCTOR BLADES
Black-Clawson Company
Lodding Engrg. Corp.
Montague Machine Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
United States Rubber Co.
Westinghouse Electric Corporation

DRIERS
Black-Clawson Company
Murray Mfg. Co., D. J.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co.
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Company
Rodney Hunt Machine Co.
Montague Machine Co.
Moore & White Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
T. B. Wood's Sons Co.
Valley Iron Works Co.
Westinghouse Electric Corporation

DRUMS
Fibre Making Processes, Inc.

DRYER DRAINAGE
Stickle Steam Specialties Co.

DUSTERS
Appleton Machine Co.

CLAFLIN REFINER

CONTINUOUS BEATING: Three No. 2 Claflins in series. Furnish of Southern Bleached Kraft — 50 tons/day. Pulping operation—through three Claflins—to beaters used only for mixing—to Jordans for final cutting control to paper machine. Total of 540 h.p. on Claflins. Freeness drop from 685 c.c. to 310 c.c.

BATCH BEATING: No. 2 Claflin — Furnish of Southern Bleached Kraft—2,000# batch. Stock pumped from chest into Claflin to another chest. At end of 15 minutes and two passes, Freeness 548, a drop of 72 c.c. At end of 30 minutes, after 4 passes, Freeness 476, drop of 144 c.c. At end of 45 minutes and 6 passes, Freeness 400, drop of 220 c.c. Mullen 72%—548 c.c., 102%—476 c.c. and 145%—400 c.c.

Adaptable also for brushing out fibre bundles and lumps with minimum degree of cutting and reduction of Freeness. (Tissues).

LARGER CAPACITY NO. 3 SOON AVAILABLE

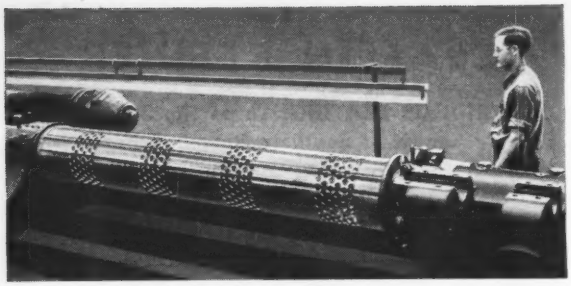
THE HERMANN MFG. COMPANY
LANCASTER, OHIO

SCREENS for PAPER and PULP MILLS

PERFORMANCE of your Centrifugals Shakers and Drainers definitely improved by the use of precision screens built to your specifications. Let us "sit in" on your screening problems.

The Harrington & King PERFORATING CO.

5652 Fillmore St., Chicago 44, Ill.—114 Liberty St., New York 6, N. Y.



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Chief Sandusky Centrifugal Castings were developed over 30 years ago for the purpose of providing the paper industry with a product which would meet their requirements.

Your machine builder is equipped to supply Sandusky Centrifugally Cast roll covers and roll shells for your next application.

Specify them by name.

CHIEF SANDUSKY *CENTRIFUGAL CASTINGS*

SANDUSKY FOUNDRY AND MACHINE CO. SANDUSKY OHIO, U.S.A.

COLORS

for

Board* and *Paper

Green

CHROMIUM OXIDES

Black Brown Red Yellow

IRON OXIDES

LAMP BLACK

TALC

UMBERS

VENETIAN REDS

YELLOW OCHRES

C. K. WILLIAMS & CO.

Easton, Pa.

WHERE TO BUY

Downingtown Mfg. Co.
Fibre Making Processes, Inc.
Holyoke Machine Company
E. D. Jones & Son Co.
Moore & White Co.
Noble & Wood Machine Co.
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

DYESTUFFS

Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuffs Corp.
National Aniline Division, Allied Chemical & Dye Corp.
Paper Makers Chemical Department Hercules Powder Co.
C. K. Williams & Co.
Witco Chemical Co.

EMBOSSING ROLLS

Northern Engraving & Mch. Co.
Roehlen Engraving Works

EVAPORATORS

Black-Clawson Company
Foster Wheeler Corp.
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

FANS

General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS

Fibre Making Processes, Inc.
Hardinge Co., Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Wallace & Tiernan

FELTS

Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co., Inc.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.
Waterbury, H., & Sons Co.

FELT CONDITIONERS

Steamaire Company

FELT GUIDES

Moore & White Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS

Aluminum Flake Co.
American Colloid Co.
Amer. Cyanamid & Chem. Corp.
Amer. Resinous Chemicals Corp.
Johns-Manville Sales Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS

Cochrane Corp.
Hardinge Co., Inc.
Moore & White Co.
J. O. Ross Engrg. Corp.
Witco Chemical Co.
Worthington Pump & Machy. Corp.

FLOORING, GRATING & TREADS

Hendrick Mfg. Co.
Klemp Co., W. F.
Norton Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division
United States Rubber Co.

FORMING MACHINES

Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

FRICTION MATERIALS

Jonhs-Manville Sales Corp.

FREENESS TESTERS

Testing Machines, Inc.
Williams Apparatus Co.

GEARS

Black-Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Holyoke Machine Company
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS

Carthage Machine Co.
Farrel-Birmingham Co.
Holyoke Machine Company
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Wks.

GRINDING WHEELS

The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
Norton Company
United States Rubber Co.

HEAT EXCHANGERS

Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEAT RECOVERY SYSTEMS

Foster Wheeler Corp.
Stickle Steam Specialties Co.

HEATING, VENTILATING AND AIR CONDITIONING

The Appleton Machine Co.
Armstrong Machine Works
Cochrane Corp.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthington Pump & Machy. Corp.

HOISTS

Appleton Machine Co.
Dilts Machine Works
Holyoke Machine Company
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.
Reading Chain & Block Corp.

HOSE (Air, Water, Suction, etc.)

The Cincinnati Rubber Mfg. Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division
United States Rubber Co.

HUMIDITY CONTROL

Spray Engrg. Company
Steamaire Company

HYDRAPULPERS

Ross Paper Machy. Co.

INSTRUMENTS, TESTING AND MEASURING

Bauer Brothers Co.
N. P. Bowsher
The Bristol Company
Cochrane Corp.
The Foxboro Company
General Electric Company
W. & L. B. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Wallace & Tiernan Instrument Co.
Williams Apparatus Co.

INSULATION

Johns-Manville Sales Corp.

JOINTS

Perfecting Service Company

JORDAN FILLINGS

Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES

Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.

WHERE TO BUY

E. D. Jones & Sons Co.
Valley Iron Works Co.

KNOTTERS
Fibre Making Processes, Inc.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
The Biggs Boiler Works Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
Williams Apparatus Co.

LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers Machine Co.

LINTER COTTON
The Railway Supply & Mfg. Co.

LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

LUBRICATORS
Hills-McCanna Co.

MATERIAL HANDLING
Automatic Transportation Co.
Brooks Equipt. & Mfg. Co.
Northwest Engrg. Co.
Reading Chain & Block Company

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Testing Machines, Inc.
Walker-Goulard-Plehn Co.

MOISTENING EQUIPMENT
The Spray Engineering Co.
Steamaire Company

MOISTURE CONTROL CONTROL
Spray Engrg. Company
Steamaire Company
Stickle Steam Specialties Co.
Williams Apparatus Co.

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
Continental Electric Co.
De Laval Steam Turbine Co.
General Electric Company
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation

NOZZLES
Spray Engrg. Company
Steamaire Company

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
Johns-Manville Sales Corp.
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Bagley & Sewall Co.
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Wks.
Valley Iron Works Co.

PAPER MILL BUILDERS
Merritt-Chapman & Scott Corp.
The Rust Engrg. Co.

PAPER TUBE MACHINERY
Theo. Adams
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
South Wabash Engrg. Co.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corp., John

PENSTOCKS, WELDED STEEL
The Biggs Boiler Works Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

PIPE
Black-Clawson Company
Crane Company
Deublin Company
Grinnell Company
Johns-Manville Sales Corp.
Stowe-Woodward, Inc.
Stowe-Wodward, Inc.
Taylor Forge & Pipe Works
Walworth Company

PLATERS
Perkins & Son, Inc., B. F.
Holyoke Machine Company

PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLATE WORK (Steel & Alloy)
The Biggs Boiler Works Co.

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

PRESSURE VESSELS, STEEL AND ALLOY
The Biggs Boiler Works Co.
Foster Wheeler Corp.

PRESSES
Black-Clawson Company
Dietz Machine Works
Farrel-Birmingham Co.
Fibre Making Processes, Inc.
Thomas W. Hall Co.
Holyoke Machine Company
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rotogravure Engineering Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John
Weber, Herman G.
Williams Apparatus Co.

PULPERS
Bauer Brothers Co.

PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Elof Hansson, Inc.
Lyddon & Co., (America) Inc.
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.

PULPSTONES
Norton Company

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Buffalo Pumps, Inc.
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hardinge Co., Inc.
Hills-McCanna Co.
Holyoke Machine Company
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Morris Machine Works
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Steamaire Company
Warren Steam Pump Company
Worthington Pump & Machy. Corp.

RAG COOKING PROCESSES
The Kinsley Chemical Company

RAG CUTTERS
Holyoke Machine Company
B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones Corp.
Ross Engineering Corp., J. O.
Valley Iron Works Co.

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Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Charleston, South Carolina

Fig. 45 — Biggs 14 ft. dia. welded rotary digester with worm-and-segment drive.

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Write for Bulletin 45.

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Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
Cochrane Corp.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Stickle Steam Specialties Co.
Taylor Instrument Companies
Trimbey Mach. Wks.
Wallace & Tiernan
Westinghouse Electric Corporation

RESINS
Amer. Cyanamid & Chemical Corp.
Amer. Resinous Chemicals Corp.
Monsanto Chemical Co.
The Resinous Prod. & Chem. Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Holyoke Machine Company
Improved Paper Machy. Corp.
Lobdell Co.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F., & Sons Co.
Philbrick Engrg. & Machine Co.
Pusey & Jones Corp.
Raybestos-Manhattan, Inc.
Manhattan Rubber Division
Roehlen Engraving Works
J. J. Ross Company
Ross Paper Machy. Co.
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
Stowe-Woodward, Inc.
United States Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward, Inc.

ROLL STANDS
Cameron Machine Co.
The Kohler System Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

ROOFING MATERIALS
Johns-Manville Sales Corp.

ROTARY BOILERS
Biggs Boiler Works

SATURATING MACHINES
Black-Clawson Company
Moore & White Co.
Noble & Wood Machine Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

SAVEALLS
Bulkley, Dunton Pulp Co., Inc.

SCALES
Merrick Scale Mfg. Co.

SCREEN PLATES
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Testing Machines, Inc.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co.
E. D. Jones & Sons Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Trimbey Mach. Wks.
Valley Iron Works Co.

SHEET MACHINES
Thomas W. Hall Co.
The Hermann Manufacturing Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.
Williams Apparatus Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co.
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.

SIZING
Amer. Cyanamid & Chemical Co.
Amer. Resinous Chemicals Corp.
Black-Clawson Company
The Dow Chemical Company
du Pont, E. I., de Nemours & Co.
Flintkote Company
Kelco Company
Monsanto Chemical Co.
National Oil Products Co.
Paper Makers Chemical Department
Hercules Powder Co.
Philadelphia Quartz Co.
Pioneer Salt Company
Socony-Vacuum Co.
Stein, Hall & Co., Inc.

SLIME CONTROL
Falls Chemical Products Co.
Magnus Chemical Co.
Mallinckrodt Chemical Wks.

SLITTERS
Theo. Adams
Black-Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Valley Iron Works Co.
Waldron Corp., John

SMOKE STACKS
The Biggs Boiler Works Co.

SOLENOID VALVES
Steamaire Company

SPRAYING EQUIPMENT
The Spray Engineering Co.
Steamaire Company

STAINLESS STEEL
Anti-Corrosive Metal Products Co., Inc.
U. S. Steel Corp.

STARCH
Amer. Cyanamid & Chemical Corp.
Clinton Industries, Inc.
National Starch Products, Inc.
Stein, Hall & Co., Inc.

STATIC ELIMINATORS
Steamaire Company

STEAM SPECIALTIES
Babcock & Wilcox Co.
Cochrane Corp.
Johnson Corp.
Perfecting Service Company
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

WHERE TO BUY

STEEL
American Rolling Mill Co.
Anti-Corrosive Metal Prod. Co.
Carnegie Illinois Steel Co.
U. S. Steel Corp.

STEEL TANKS
The Biggs Boiler Wks. Co.

STROPPING & STRAPPING MACHINES
Acme Steel Company
The Stanley Works

STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

SUCTION BOXES
Black-Clawson Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Westinghouse Electric Corp.

SULPHUR
Amer. Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company

SULPHUR BURNERS
Valley Iron Works Co.

SULPHUR DIOXIDE
Ansul Chemical Company

SUPERCALENDERS
B. F. Perkins & Son, Inc.

TALC
Amer. Cyanamid & Chemical Corp.
W. H. Loomis Talc Corp.

TANKS
Cochrane Corp.
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Noble & Wood Machine Co.
Raybestos-Manhattan Inc., Manhattan Rubber Division
Rodney Hunt
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
United States Rubber Co.
Waldron Corp., John
B. F. Perkins & Son, Inc.
Testing Machines, Inc.

THICKENERS, DECKERS AND SAVEALLS
Bird Machine Company
Bulkley, Dunton Pulp Co., Inc.
Carthage Machine Co.
Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Hardinge Co., Inc.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

TILE
Holyoke Drainer Tile Co.

TITANIUM
E. I. du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company

TOOLS
Acme Steel Company
Ingersoll-Rand Co.
The Stanley Works
Walworth Company

TRUCKS
Automatic Transportation Co.

TRAPS
Armstrong Machine Works
Cochrane Corp.
Crane Co.
Grinnell Company
Johnson Corporation
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

TUBS
Rodney Hunt Machine Co.
Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.

TURBINES
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machy. Corp.

TURPENTINE RECOVERY
Foster Wheeler Corp.

USED EQUIPMENT
Frank H. Davis Company
Gibbs-Brower Co.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
Shartle Brothers Machine Co.

VALVES
The Bristol Company
Cochrane Corp.
Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
E. D. Jones & Sons Co.
Magnus Metal Corp.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Trimbey Mach. Wks.
Valley Iron Works Co.
Walworth Company

VALVES, LUBRICATED PLUG
American Car & Foundry Co.

VATS & VAT PARTS
Union Machine Co.
Union Screen Plate Co.

WASHERS
Bird Machine Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

WATER CONDITIONING
Calgon, Inc.
Cochrane Corp.
The Permutit Company

WATER DISPERSIONS
American Anode, Inc.

WAXING MACHINERY
Black-Clawson Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

WELDING EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Company
Walworth Company
Westinghouse Electric Corp.

WET MACHINES
Black-Clawson Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Company
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

WINDERS AND REWINDERS
Black-Clawson Company
Cameron Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Waldron Corp., John

WIRES
Appleton Wire Works
Black-Clawson Company
Bulkley, Dunton Pulp Co., Inc.
Cheney Bigelow Wire Works
Hayden Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Shartle Brothers Machine Co.

WOOD PEELERS
Nekoosa Fdy. & Mch. Wks., Inc.

WOOD SPLITTERS
Carthage Machine Co.

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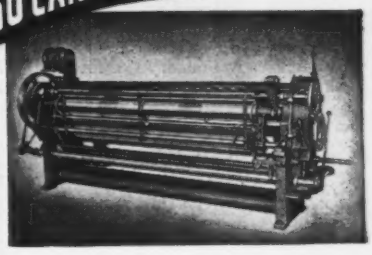

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Toilet, Towels, Crepe, Jumbo Roll.

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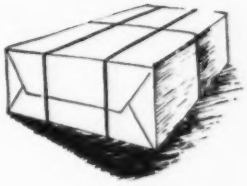

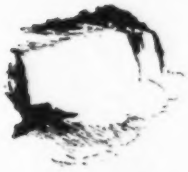

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